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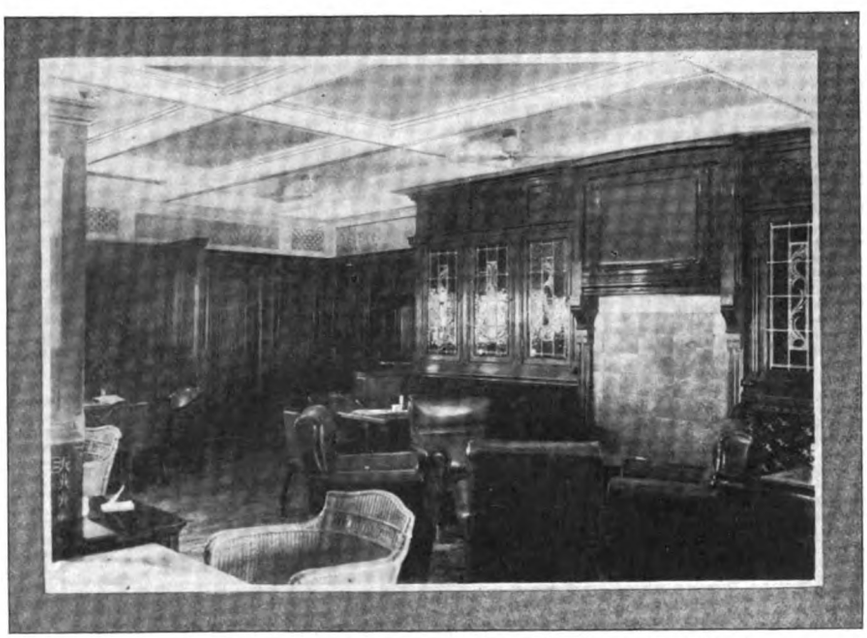
Konigin Emma

She is the Largest Vessel so Far Built in Holland—Some of Her Features

THE twin-screw mail steamer Konigin Emma, built by the "Fijenoord" Shipbuilding & Engineering Works, of Rotterdam, for the Netherland Steamship Co., of Amsterdam, is not only larger than any other of the steamers of this fleet, but she is the largest vessel which has yet been built in Holland. She takes the highest class of Lloyd's Registry, and has the following dimensions:

Length between perpendiculars 470 feet, breadth, molded, 57 feet, depth, molded to main deck, 29 feet 11½ inches, depth, molded to upper deck, 37 feet 11½ inches. The draft upon summer freeboard is 26 feet 1¾ inches, the displacement upon the draft being 14,350 tons, and the deadweight capacity 7,000 tons.

A cellular double bottom extends practically over the whole length of the ship. There is accomodation for 269 first and second-class passengers, 34 third-class, and 140 steerage passengers. The crew consists of about 200 men, so that the total complement is approximately 650. The ship has two pole masts with semaphore, wireless telegraphy and a submarine bell signal. There are on board ten lifeboats, 2 motor lifeboats, and a captain's boat, giving sufficient room for all passengers and crew.



FIRST CLASS SMOKING ROOM OF THE KONIGIN EMMA

The first-class passenger arrangements are most luxurious, and were designed by Mr. Lion Cachet and the sculptor Van Zyl; the firm of Mutters, of The Hague, being responsible for the execution of the work. A meat store, bakery, galleys, refrigerating plant, electric washing and ironing arrangements, gymnasium, and all the luxuries and conveniences incidental to a modern mail steamer are placed on the upper decks. There are two quadruple-expansion steam engines, balanced on the Yarrow, Schlick and Tweedy system, and vibration is reduced to a minimum. The diameters of the cylinders are 24½ inches, 34½ inches, 47 inches and 71½ inches, with a stroke of 45 inches. The valves are of the flat-balanced type, fitted with the Fijenoord system of reversing engines. The engines are designed to develop 6,700 b. h. p., at 95 r. p. m., and are fitted with Schmidt's superheating system. There are two single-ended and three double-ended boilers, working at 210 pounds pressure. The superheating can be carried to 300 degrees Cent., but special arrangements allow of this temperature being reduced to any required degree. All of the boilers are provided with Howden's system of forced draft. Each engine has a separate condenser of the Fijenoord draft, with 3,250 square feet of cooling surface. The propellers are three-bladed, 16

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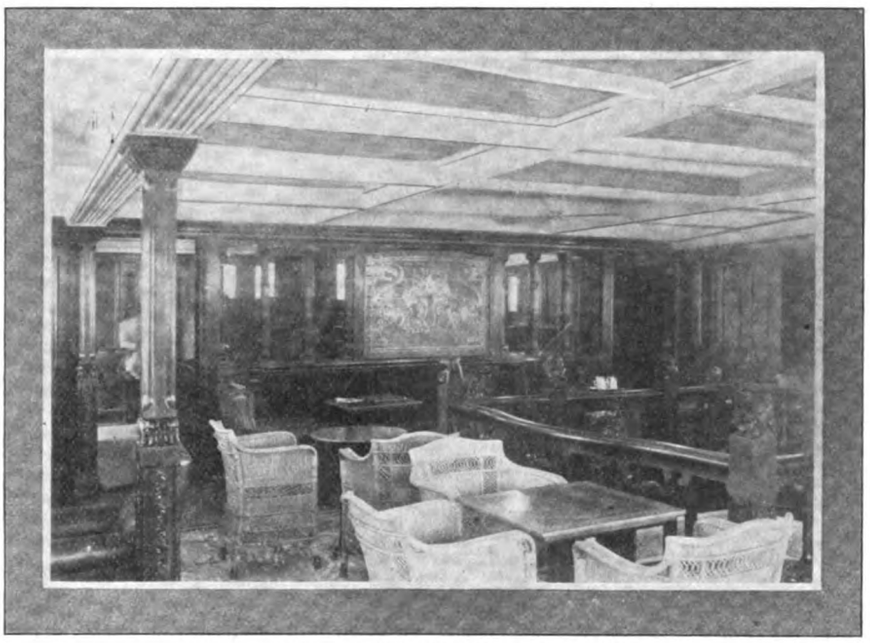
feet diameter, with Bull's metal blades.

The numerous auxiliary engines, which, for the greater part, are on the rotary principle, are driven by steam turbines or electro-motors. The condenser air pumps are rotary pumps of the Westinghouse-Leblanc system, and the centrifugal feed pumps are driven by De Laval steam turbines. There are also Woodeson's auxiliary steam pumps. The circulation pumps and ballast pump are operated electrically, and the fan for the forced draft may be driven either by steam or electricity. The electric current for the auxiliary engines and lighting is supplied by four dynamos of 100 kilowatt each, driven by A. E. G. steam turbines. There are six steam winches for discharging cargo, and six hydraulic cranes by Messrs. Brown Bros. & Co. Messrs. Hastie have supplied the steam steering gear with telemotors, and the electric hydraulic steering gear is on the Hele-Shaw system. The refrigerating plant for provisions and cargo is very complete and has been supplied by Messrs. Freundlich, of Dusseldorf. The doors in the watertight bulkheads can be closed from the bridge simultaneously by hydraulic pressure on the Stone-Lloyd system. For the disinfection of the various compartments a separate system of piping discharges Marrot gas into all compartments. A complete steam heating arrangement has been fitted by Messrs. Noske, of Hamburg. The Konigin Emma has been built to the designs of Mr. M. A. Cornelissen, naval architect, and Mr. S. G. Visker, superintending engineer of the Netherlands Steamship Co.



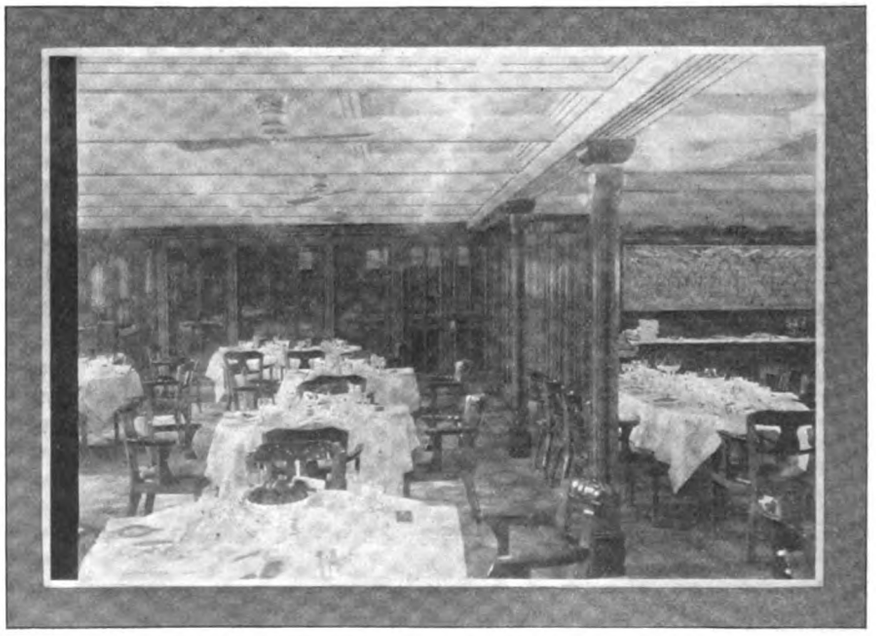
SOCIAL HALL OF KONIGIN EMMA

The Capsizing of Damaged Ships

Since the outbreak of hostilities many vessels have been sunk at sea. Reports show that in the majority of cases they have settled down at one end and finally disappeared. There are, however, three or four instances of vessels capsizing after being damaged. The statement issued by the Press Bureau in regard to the action between the Carmania and Cap Trafalgar contains the words "The action lasted one hour and forty-five minutes, when the German ship capsized and sank." The Rotterdam correspondent of the *Times*, in writing the story of the regrettable loss of the three British cruisers off the Dutch coast, points out that the Aboukir and Hogue turned turtle, while the captain of the Dutch trawler Flora saw the Cressy suddenly heel over and go down, and the chief gunner and doctor of the Cressy both report that their vessel turned over. The former also saw the Aboukir capsize. A member of the crew of H. M. S. Lowestoft stated that when they arrived the Aboukir had disappeared, and only the bottoms of the other two could be seen. This seaman also stated that the Aboukir kept afloat for 25 minutes, and the other two sank within five minutes of being hit. These times may not be quite accurate, but they are probably near the truth. In the case of the Cressy, the period of five minutes would be taken from the time when the vessel was struck a second time, since the first hit was not very effective. To these incidents may be added the recent sinking of a liner by collision, which capsized so quickly that it was impossible to find time to launch the lifeboats.

Settles Fore or Aft

Now, it has generally been taken as a well demonstrated fact that when a vessel is damaged underwater she settles down by the bow or the stern, but does not capsize. This has been placed on record as the opinion of the present Bulkhead Committee, all the members of which produced evidence early this year to show that there was no known case of a vessel having been bilged in service and then capsizing. The regulations laid down by the International Conference for the Safety of Life at Sea make no provision for preserving the stability after bilging. At the recent



FIRST-CLASS DINING SALOON OF THE KONIGIN EMMA

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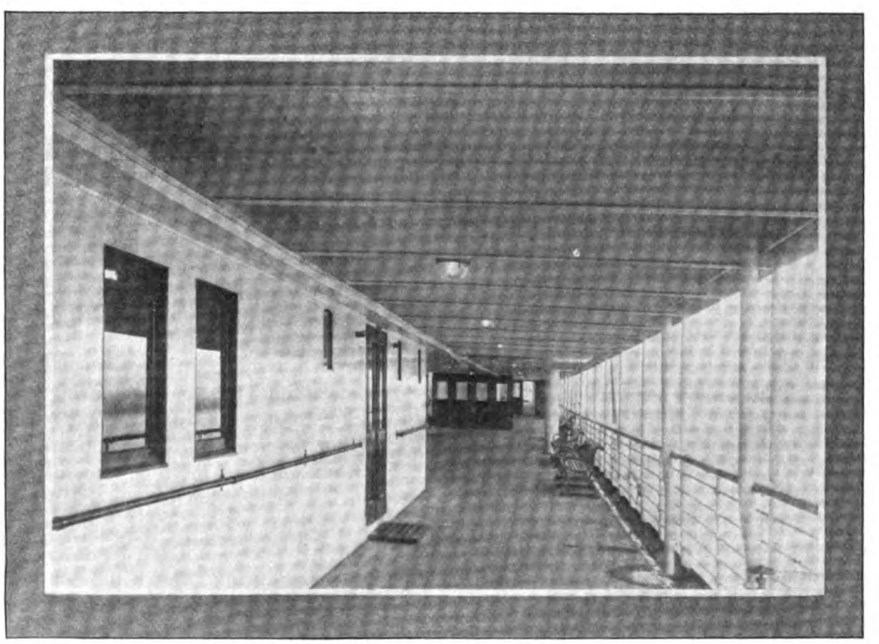
spring meetings of the Institution of Naval Architects, a paper was read by Mr. P. Brimblecombe, dealing with the stability of ships in damaged conditions. The author considered a standard vessel 400 feet in length and 48 feet in breadth, using four depths of 32, 27, 22, and 17 feet to the bulkhead deck, and two drafts for each depth. The drafts taken for the 32 feet depth were 23 feet 4 inches and 26 feet. It will be seen from these figures that a good range of possible vessels was covered. The cargo was taken as stowed in three distinct ways as follows:—(a) Homogeneously distributed throughout, (b) concentrated in the lower holds, (c) filling the compartments to just below the flooded waterline. The maximum damage assumed was just sufficient to sink the vessel to the margin of the safety line as defined by the Bulkhead Committee of 1890. For homogeneous cargo the author found that for both drafts and for all depths, the vessel possessed positive stability after flooding. With the other two cargo distributions he found that the vessel possessed negative stability after flooding, except in three cases. Two of these occurred for the deepest vessel at 26 feet draft, with cargo as in (b) and (c) respectively, and the third for the vessel of 27 feet depth at 26 feet draft and cargo as in (b). It is therefore apparent that vessels with a homogeneous distribution of cargo are safe from capsizing if they receive damage that would not sink them bodily, but the same cannot be said of those with the other arrangemets of cargo. It does not follow that the negative stability would be always great enough to capsize the vessel, but she would probably heel over and render the launching of the lifeboats very difficult. This actually happened in the Wilson liner Runo after striking a mine. It should be mentioned here that the results of the paper are based on the assumption of a reasonable stability for the ship in the undamaged condition.



PROMENADE DECK OF THE KONIGIN EMMA

Capsizing After Damage

It is very remarkable that shortly after this strong expression of opinion, based on practice, some four or five vessels should have capsized after receiving damage. In considering these vessels, it will be seen that all large passenger steamers present the case of a ship with cargo concentrated in the lower holds. For damage amidships the machinery can be treated as cargo of this nature, and the passenger accommodation on one or more decks below the bulkhead deck necessitates the carriage of cargo in the lower holds. This condition of the vessel is opposed to safety against capsizing after bilging, but provision can be made for it, and the rarity of instances of this kind shows that the danger can be, and generally is, obviated. There is reason to believe that the initial stability of the Cap Trafalgar was none too good, and even a small loss would have been sufficient to render her unstable. The actual loss was certainly not small, and proved to be all sufficient to capsize her. There can be no doubt but that the initial stability of the lost cruisers was ample, that is, when considered for ordinary sea-going purposes without reference to damage, more especially in view of the minute watertight subdivision of these vessels.

In war vessels with side armor such as the three cruisers possessed it is customary to investigate their stability assuming the unarmored ends riddled and open to the sea, in order to ensure its sufficiency. In making these calculations, the protective deck at the ends of the vessel, just below the waterline, is assumed to be unpierced. It was the practice in some warships, for example the Inflexible, to provide cork packing or similar material at the unarmored ends to assist the stability in the same manner as cargo in the region of the flooded waterline assists it.

Watertight Subdivision

It is advisable at this stage, before analyzing the causes that operated in capsizing the three cruisers, to consider the possible methods of watertight subdivision, and their effects on stability after damage. Three methods can be adopted, separately or in conjunction; they are transverse, longitudinal, and horizontal subdivision. The case for transverse subdivision was well stated during the discussion on the preceding paper to the above, by Mr. Whiting, who said, "I believe it is not too much to say that, for the purpose of assuring a reasonable degree of safety in merchant ships, transverse watertight subdivision is always essential, is generally sufficient, and, for many ships and classes of ships, is all that one can expect." For intermediate and cargo ships any other kind of subdivision would make a very inconvenient, if not impossible, arrangement, and viewed by the results obtained in the above paper would be unnecessary, since at drafts approaching the deep load the cargo would be more or less homogeneously distributed, and extend to the flooded waterline. Longitudinal subdivision is of great value provided two conditions are fulfilled. It is necessary that any watertight doors in the longitudinal bulkheads should be closed when the damage occurs, and that the water should find ready access across the ship to the corresponding compartment on the opposite side. If the wing longitudinal compartments are used as coal bunkers, watertight doors must be fitted, and it is very doubtful if these could be closed quick enough to prevent the stokehold from being flooded. Any passage ways for the flow of water across the ship would probably be choked by coal, and the water on one side only would place the vessel in great danger from capsizing.

The horizontal method of subdivision, by watertight decks, has the great vir-

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tue of increasing the stability of the vessel after damage, provided this occurs below the deck. It is equivalent to treating the compartments under the deck as ballast tanks and filling them with water. As long as the ship can afford to lose this buoyancy, and the transverse subdivision ensures this, the vessel has more statical stability than she possessed before the damage was received. Should the deck be broken the vessel is no worse off than if she was provided with transverse subdivision only, and, even then, the deck may not be punctured in all the transverse compartments affected.

Horizontal Subdivision

It has already been pointed out that horizontal subdivision is not necessary in intermediate and cargo boats, and it is not suggested that it is essential in all passenger vessels. In large liners the necessity or otherwise of horizontal subdivision must be considered on the merits of the individual vessel. Deciding factors will be amount of stability in sea-going condition, ratios of beam to draft and depth to draft, and distribution of the cargo. From a practical standpoint it should not be difficult to make the lowest passenger deck watertight. This would entail watertight cargo hatches, a matter that could easily be arranged in view of the moderate size of these in first class passenger vessels, or a simpler solution could be found in the provision of watertight cargo trunks extending to the bulkhead deck. Steel trunks are not uncommon in these vessels at present, and watertightness could easily be secured. In addition, the hold ventilators would have to be made watertight up to the bulkhead deck. The holds below the lowest passenger deck would, in effect, become deep tanks with expansion trunks as in oil carriers, except that the heavy scantlings provided in the latter, for regular carriage of oil, would not be required. It is obviously impracticable to provide a watertight deck over the machinery compartments, the solution there would be found in making the lowest continuous deck, or the one above it, watertight, and carrying the machinery casings from it, watertight to the bulkhead deck.

Large Initial Stability

As an alternative to horizontal subdivision, large initial stability could be provided to prevent the negative stability from becoming excessive in the damaged condition. In certain cases, however, the initial stability would require to be much in excess of that necessary for safe and comfortable sea-going, and would not be tried on that account.

On first consideration, it might appear that shallow draft steamers of the cross-channel or river type would be very unstable after receiving damage. The large ratios of beam to draft and depth to draft would apparently form the basis for this conclusion. Examination shows that the actual state of affairs is otherwise. The bulkhead deck is, with very few exceptions, the one next below the weather or strength deck, and these depths are only a small proportion of the length of the vessel. The actual ratio to depth (to bulkhead deck) to draft is accordingly not so large as it appears to be when the depth to the weather deck is taken, In addition although the vessel carries no carge, the interior fittings, outside the machinery compartments, being fairly uniformly distributed, can be looked on as homogeneous cargo in so far as they effect the question. The initial stability of these boats is generally large, especially in those carrying a large number of passengers. The result is that this class of vessel maintains ample stability after being bilged, and transverse subdivision can be made sufficient to meet all contingencies.

In warships all three methods of subdivision are adopted, with the result that the vessels are divided into a very large number of small watertight compartments. This enables a vessel to remain afloat after sustaining considerable damage by gunfire, and in some cases by torpedo explosion. The latter is proved by the fact that the Cressy remained afloat for about an hour after being struck by the first torpedo. The damage, however, inflicted by a torpedo explosion in cruisers of this type will generally be excessive, as borne out by the rapid sinking of the three cruisers, on account of the absence of protection against this form of attack—protection which cannot well be provided as in battleships and battle-cruisers. It is safe to say that the horizontal watertight decks and flats in the Cressy, Aboukir and Hogue were broken by the force of the explosions, and these gone, consideration of the ratios of beam to draft and depth to draft indicates that the stability took a large negative value.

The conclusion to be drawn from the above considerations is that it is unnecessary and undesirable to introduce legislation for the provision of horizontal subdivision in merchant vessels. Vessels in which this method of subdivision would be beneficial are few and far between, and it would be unfair to penalise the majority for the minority. Nevertheless, cases do arise where horizontal subdivision should be adopted and a little investigation would determine its necessity or otherwise.—*Liverpool Journal of Commerce.*

Slides in Panama Canal

A large slide on the east bank of Culebra Cut, Panama canal, directly north of Gold Hill, moving between 5 p. m., Wednesday, Oct. 14, and 9 a. m., Thursday, Oct. 15, carried about 725,000 cubic yards of earth and rock into the Canal prism, and blocked the channel for 1,000 feet to the passage of vessels larger than towboats causing the suspension of traffic. This occurred two months, to the day, after the official opening of the canal to commercial traffic.

The big dredges were working at Cucaracha slide, south of Gold Hill, at the time the slide started, and with commendable foresight on the parts of Messrs. Comber and Macfarlane steps were taken to move them northward; but for this action the results secured could not have been accomplished, as the condition of the channel was such that loaded barges could not be passed through the slide. The dredges were worked under triple shift. The 15-yard dipper dredges Gamboa and Paraiso, and the 5-yard dipper dredge Mindi, began excavation at the north side of the slide during the night of Oct. 14-15, while the mass was still in motion. The dipper dredge Cardenas was added to the fleet on Oct. 15, and during the 16th an extension of discharge pipe was laid from a point opposite Cucaracha slide, which allowed the pipe line suction dredge No. 86 to take part in the work.

The channel was cleared sufficiently by noon of Tuesday, Oct. 20, to allow the passage during the afternoon of seven vessels, which had been delayed at the south end of the canal. The vessels had been taken to Pedro Miguel Lock and moored alongside the approach piers and within the lock. The actual passage of the seven through the cut occupied about four hours; they followed each other at intervals of about half an hour, propelled by their own power, but passing the slide under the control of a tug fore and aft, to hold them to the course.

A good story is told in Newcastle to the effect that a shipowner upon hearing that the British Admiralty wanted a boat of a certain size for a certain port, offered his vessel at a pretty stiff rate. The admiralty simply asked the name of the boat and owner from the broker and forthwith commandeered her, leaving the owner to speculate what rate the admiralty court will eventually award him.

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Panama Canal Equipment

It Will Have Complete Facilities for Supplying Vessels With Coal, Fuel, Oil and Miscellaneous Stores

THE Isthmian Canal Commission announces that the Panama canal is to be equipped with complete facilities for shipping vessels with coal, fuel, oil, miscellaneous stores and general supplies such as are taken on at any of the great ports of the world; and for dry docking and repairing vessels of the largest size now afloat. The facilities for this service are not all completed at this time, but the accommodations for shipping, other than in dry docking vessels, are ample for the traffic, and all the facilities are being pushed toward completion. Following is a summary of present accommodations. A compendium of charges is given at the end of the article.

Fuel

Coal may be taken on at either the Atlantic or the Pacific terminal, but it costs $1 a ton more at Balboa than at Cristobal, on account of the cost of transportation across the Isthmus. The coal comes from the fields of Virginia and West Virginia and is shipped to the Atlantic seaboard. It is handled to vessels at the Atlantic end of the canal by a cantilever crane, commanding a coal wharf, or in lighters, and at the Pacific end lighters are the present means. Between 600 and 750 tons can be taken on in the working day of nine hours at either terminal, with the present facilities.

Fuel oil is supplied at the Pacific terminus by the Union Oil Co. The berth alongside its crib carries 30 feet of water at mean tide. Oil is delivered from tanks, aggregating 150,000 barrels capacity, at the rate of from 1,300 to 1,600 barrels per hour. The Panama canal is constructing extensive fuel oil handling plants at both terminals. A number of tanks belonging to individuals and companies will be connected with the plants, as well as two 42,000-barrel tanks belonging to the government, at each terminal. Upon the completion of its plants, in January, 1915, the Panama canal will assume entire control of handling oil.

Water is sold at the rate of 25 cents per 1,000 gallons, delivered at the dock, but the minimum charge is $3. Ships passing through the canal may take up fresh water from the lakes without hindrance. Not all of this water, however, is entirely clean or suitable for industrial uses. All water sold at the docks is drawn from the regular water supply systems and has been purified.

General Supplies

As the Panama canal and the Panama Railroad Co. are together operating a large number of vessels, of a variety of classes, from tugs to ocean-going passenger and freight vessels, supplies for practically any kind of vessel are kept on hand on the Isthmus. Such supplies are for sale to all ships using the canal, or calling at the terminal ports. The storehouses at Cristobal and Balboa have in stock all standard lubricants, light and heavy hardware, cordage, and miscellaneous ship chandlery supplies.

Foodstuffs and the general variety of merchandise handled by the commissary department of the Panama canal may be purchased for ships. The fact that the supply department is supplying regularly most of the food and wearing apparel of approximately 50,000 people is a warrant that its operations are on a scale which can easily include the needs of ships now coming to the canal. Prices are generally lower than the retail prices in the United States, or possibly about 10 per cent higher than the wholesale prices there, and compare favorably with prices in any port of the world.

A large stock of fresh meats, vegetables, fruits, canned groceries, bakery products, etc., is always on hand, and advance arrangements can be made for supplies of any article obtainable in the markets of the world.

Ice may be purchased in any reasonable quantity.

Laundry is handled quickly. No advance notice is required, and ship's laundry can be returned on the same day it is received. A vessel entering the canal can forward its laundry by rail to the plant at Cristobal, or the one at Ancon, and receive it back by the time it is ready to clear from the other end of the canal. Passenger's laundry can be handled with corresponding dispatch, but it is preferred to have at least two days for the work.

Repairs

Except for the limitations imposed at present by the absence of a large dry dock, and of lathes for turning the largest crank shafts and longest line shafts of modern vessels, the canal shops can do practically any repair work which a vessel might bring. Sufficient materials, including heavy billets and all sizes of plates and angles, are kept on hand to meet every possible need. The foundry can make steel castings up to five tons in weight, and iron castings up to 10 tons, as well as brass castings of any ordinary size.

The shops at Balboa are equipped with a 540-ton hydraulic forging press, an open side extension planer with capacity to plane 132 inches wide, 96 inches high, and 24 feet long, lathes large enough for ordinary line shaft work, and the usual accessories of fully equipped machine, boiler, and shipfitters' shops. The shops alongside the dry dock at Mount Hope can do small machine work of moderate size, and practically any plate work likely to be required. By submitting to the delay necessary to transport parts to Balboa, all the facilities of the Balboa shops are also available for work at Mount Hope. The Mount Hope dry dock can take ships drawing 13½ feet of water and 300 feet long; the permanent dry dock now under construction at Balboa will take any vessel that can pass through the canal.

The Balboa shops contain a plant for the generation of oxygen and acetylene, and both they and the shops at Mount Hope are equipped with tools for all kinds of cutting and welding. Compressed air, steam, water, oil, and electric current are available at the repair wharves in the maximum quantity required. Locomotive and wrecking cranes are available at the wharf side for lifting and a derrick barge with a lifting capacity of 40 tons may be brought into service if necessary. Two floating derricks of 250-tons capacity each are being erected now, and are to be ready for service in December, 1914.

Contracts for doing repair work at a stated cost cannot be made by the Panama canal, though estimates of probable cost can be furnished from the shops. Charges are made on the basis of actual cost of repairs, plus a percentage to cover overhead expenses, prescribed by the Panama canal.

The Hotel Washington at Colon and

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the Totel Tivoli at Ancon, adjoining Balboa, and the Hotel Aspinwall, on Taboga Island, are owned and operated by the government for the accommodation of the traveling public. Reservations can be made in the same way as at privately owned hotels.

Ancon Hospital is equipped with 800 beds. It treats about 35,000 cases a year, in which approximately 7,000 surgical operations are performed. Its staff of physicians and surgeons includes men of marked experience and ability, and several experts in tropical medicine. The treatment of cases from neighboring countries and from ships is a part of its regular work.

Direct cable connections extend from the Isthmus to New York and to the west coasts of Mexico, Central and South America. The radio stations at Colon and Balboa handle commercial business.

Method of Application

Steamship captains, or agents, desiring the services of the Panama canal in the way of supplies, repairs, etc., will receive prompt response on communicating with the captain of the port at Balboa or Cristobal. Ships may communicate their wants by radio, in advance of arrival. The canal organization, having made ample preparations for serving vessels, is desirous of giving prompt and satisfactory service on a business-like basis, without unnecessary delay or red tape.

The captain of the port will furnish information in regard to placing orders, and should be notified of all orders placed, so that he may be able to keep track of them in relation to clearing ship, etc. If orders are placed direct, applications should be made to the following:

Coal — Receiving and forwarding agent, Panama railroad, Cristobal or Balboa.

Fuel oil—Union Oil Co., Balboa, (temporarily).

Ships' supplies—Depot quartermaster, Cristobal, or quartermaster's storekeeper, Balboa.

Foodstuffs, general merchandise, ice, laundry, etc.—Depot commissary, Cristobal, or commissary storekeeper, Balboa.

Repairs—Superintendent of Mechanical division, Balboa.

Water and miscellaneous supplies, and information—Captain of the port, Cristobal, or Balboa.

Electric repairs such as wiring, lights, dynamos, etc.—Electrical engineer, Balboa Heights.

Bills for all supplies will be submitted through the offices of the deputy collectors at the ports for collection, or cash may be sent with orders. Bills for supplies furnished ships of regularly established lines will be submitted to the local agents, if desired.

Prices of Supplies

The following is a partial list of the charges prevailing at present for various services, but they are subject to change from time to time:

Coal—At Cristobal, from lighters, trimmed in bunkers, per ton, $5.40; from cars alongside wharf, handled by ships' gear, per ton, $5.15; use of steam hoist and crane, per hour, $1. At Balboa, the price is $1 more per ton, either form of delivery.

Fuel oil—Regular sales, $1.30 per barrel.

Water—Delivered at dock, 25 cents per 1,000 gallons; minimum charge, $3.

General supplies, foodstuffs, etc. — Prices are usually less than retail prices in the United States. Wholesale lists may be obtained from the offices of the port captains.

Ice—At Cristobal, 30 cents per 100 pounds; at Balboa, 35 cents per 100 pounds.

Laundry—The following representative prices will give a fair idea of charges: For passengers; drawers or undershirts, 10 cents each; socks, 5 cents per pair; collars, 3 cents each; for ships, waiters' coats, 10 cents each; blankets, 10 cents each; trousers and jackets, 5 cents each; aprons, caps, sheets, tablecloths, napkins, towels, 1 cent each.

Charges for Services

Barges and lighters—With towing machine, 400 tons or over, $2.25 per hour; without towing machine, 400 tons or over, 90 cents per hour; under 400 tons, 30 cents per hour.

The charge for barges or lighters will depend upon the kind and class of service rendered, time in use, and charges in connection with handling freight and cargo.

Wharfage—All steam or motor vessels, per day or fraction thereof, per foot of length, measured over all, 15 cents. Sailing vessels, 100 feet in length, or less, per foot, 5 cents; over 100, but less than 200 feet, per foot, 10 cents; over 200 feet, per foot, 15 cents.

Dry docking at Mount Hope—For vessel docked alone, $75 for the first day and $25 for each subsequent day. For a vessel docked with another vessel, $50 for the first day and $18 for each subsequent day.

Launches—Larger launches, for the first hour, $7.50 and $5 for each succeeding hour; smaller launches, $5 for the first hour, and $2.50 for each succeeding hour.

Diver's service—For the first four hours, or fraction thereof, from time of arrival at point of diving, $60; for each subsequent hour, $10.

Freight—Rates for handling freight depend upon the kind and class of services required. Freight is handled at the terminal ports either by the Panama railroad or the agents of vessels.

Tugs — For harbor work, shifting berths, work around piers or locks, and short tows, $15 per hour. For towing through the canal, 4 cents per displacement ton, or 10 cents per net Panama canal ton; minimum charge for towing through the canal, $150.

Pilotage—Charges are based upon the maximum draft; rate per foot, or fraction of foot exceeding 6 inches, $1. In case pilot is taken outside of the Atlantic breakwater an extra charge of $10 is imposed. There is no charge for pilotage when a vessel goes direct through the canal, without stopping at either terminal port to take on or discharge cargo or passengers. Through passengers will be allowed to land without affecting the status of the vessel in this respect.

Tolls—On merchant vessels carrying passengers or cargo, per net ton (each 100 cubic feet) of actual earning capacity, $1.20.

On vessels in ballast, without passengers or cargo, 40 per cent less than the rate for vessels with passengers or cargo, i. e., per ton, 72 cents.

On naval vessels, other than transports, colliers, hospital ships and supply ships, per displacement ton, $1.50.

On army and navy transports, colliers, hospital ships and supply ships, the vessel to be measured by the same rules as are employed in determining the net tonnage of merchant vessels, per net ton, $1.20.

Additional charges are made for deck loads, depending on the space occupied; per net vessel ton, $1.20.

For passengers, no specific charge is made, but passenger space is included in the net tonnage upon which tolls are charged.

George Simpson, 17 Battery place, New York, has been awarded contract for torsion meters for battleship No. 39, building at the New York navy yard. These torsion meters are of the Denny-Edgecombe self-recording type which has been generally adopted in the leading navies.

John A. Roebling's Sons Co., Trenton, N. J., have received contract from the Navy department for torpedo defense nets for the battleships Navada and Oklahoma. The Roebling company also constructed the nets for the Argentine battleships Rivadavia and Moreno.

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Two New Revenue Cutters

In accordance with the authority of a recent act of Congress designs were prepared by the Treasury Department for two new ships for the Revenue Cutter Service; one known during construction as No. 26, to replace the Revenue Cutter Woodbury, stationed at Portland, Maine; the other as No. 27, to replace the old Cutter Winona, now stationed at Mobile, Alabama. Bids were opened at the Treasury Department on Sept. 1st for the construction of these two vessels, and the lowest bid, that of the Newport News Shipbuilding & Dry Dock Company, in the sum of $198,000.00 for each vessel, was accepted, and the contracts have been formally awarded to that concern.

These vessels are of the same size, the only difference being that the cutter for service on the coast of Maine will be especially fitted for breaking ice in the frozen harbors and thoroughfares of the Maine coast during the winter season.

The vessels will be built of steel throughout and will be fitted with every modern means of rendering aid to vessels in distress. of destroying derelicts and for the other purposes of the revenue cutter service.

Each vessel will be 165 feet 6 inches long over all, 150 feet long between perpendiculars, 32 feet beam moulded, with a depth of 20 feet 9 inches. Their displacement at a mean draft of 11 feet 6 inches, with 200 tons of coal, 13,000 gallons of fresh water and 12 tons of stores will be 900 tons. They will be flush decked and schooner rigged.

Ample and comfortable quarters for a crew of about 60 men and eight officers will be provided.

Each vessel will be fitted with a powerful radio apparatus, as that is found to be indispensable for the regular routine work of the service.

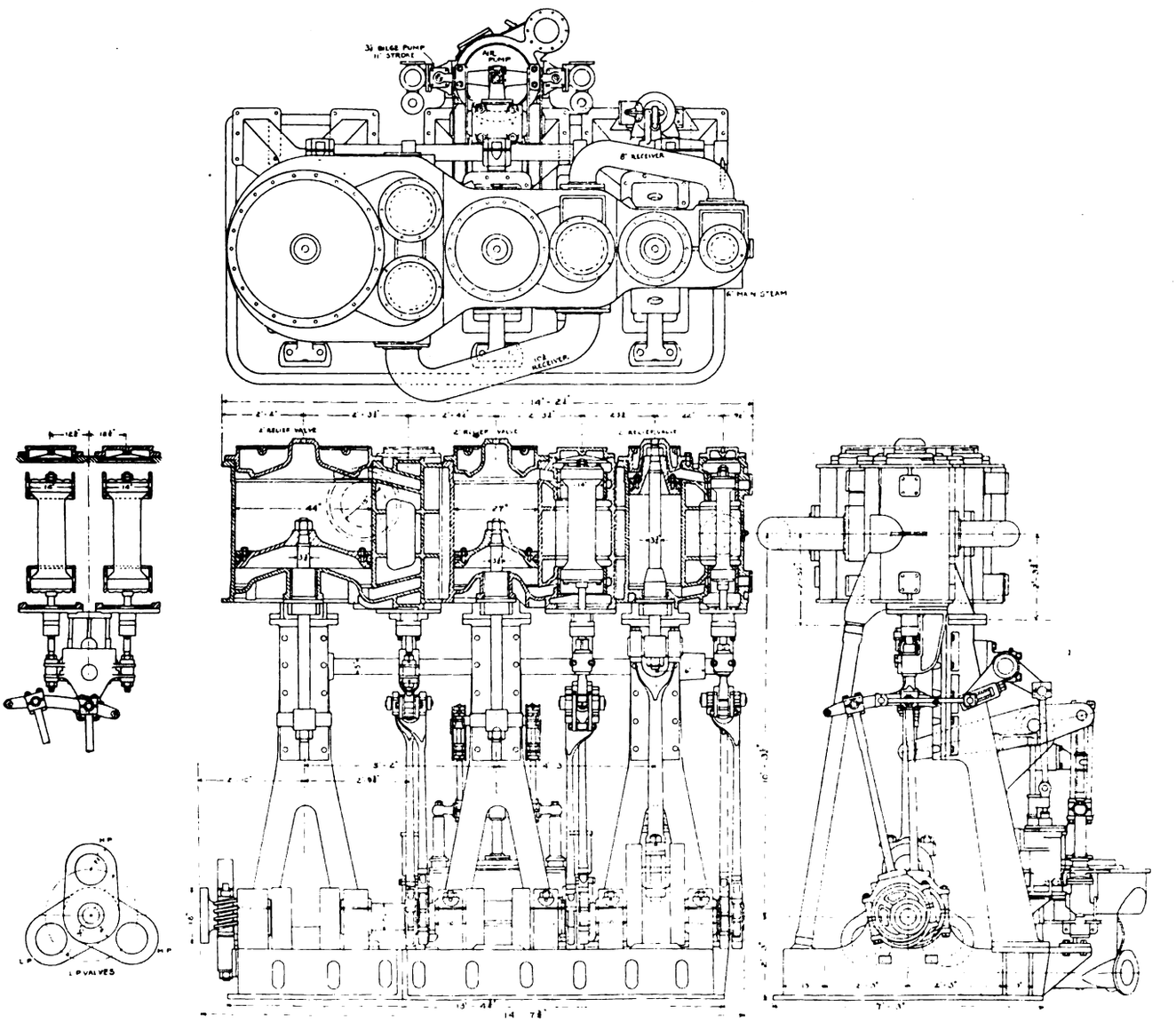
The equipment will comprise five able boats, steam steering engine, steam windlass, steam capstans for handling towing lines and various other auxiliaries to make them first-class revenue cutters in every respect.

The propelling machinery will consist of one triple-expansion engine 17 x 27 x 44 x 30 inches stroke. The indicated horsepower will be about 1,000 under maximum conditions.

Steam will be furnished by two straight tube water-tube boilers, working at 180 pounds steam pressure.

Powerful fire pumps and wrecking siphons will be fitted to each vessel to fit them for rescue work.

Since the contract has been awarded, as it was found that there was a sufficient fund left from the original appropriation, arrangements have been



ARRANGEMENT OF MACHINERY OF REVENUE CUTTERS NOS. 26 AND 27

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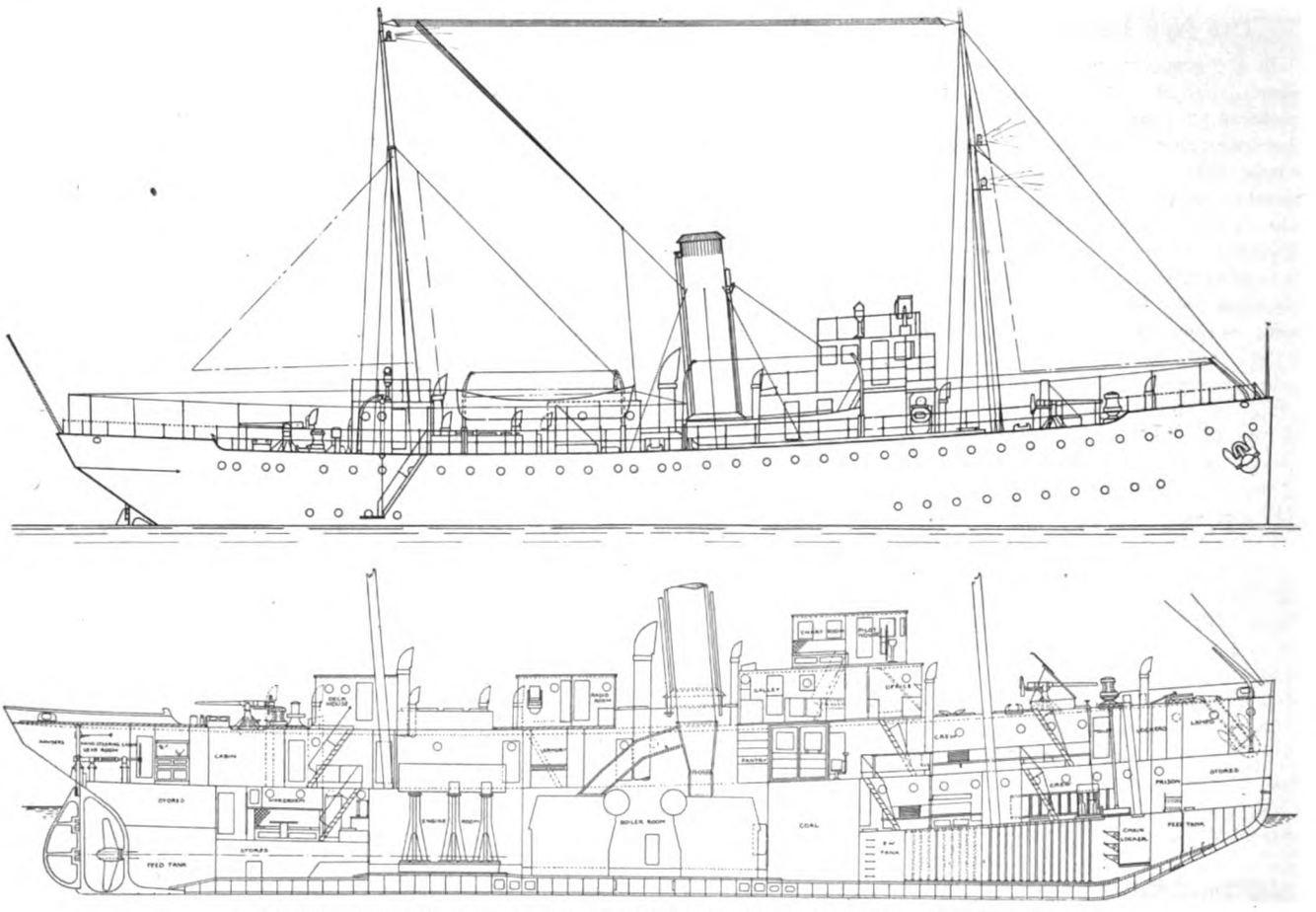


INBOARD AND OUTBOARD PROFILES OF REVENUE CUTTERS NOS. 26 AND 27

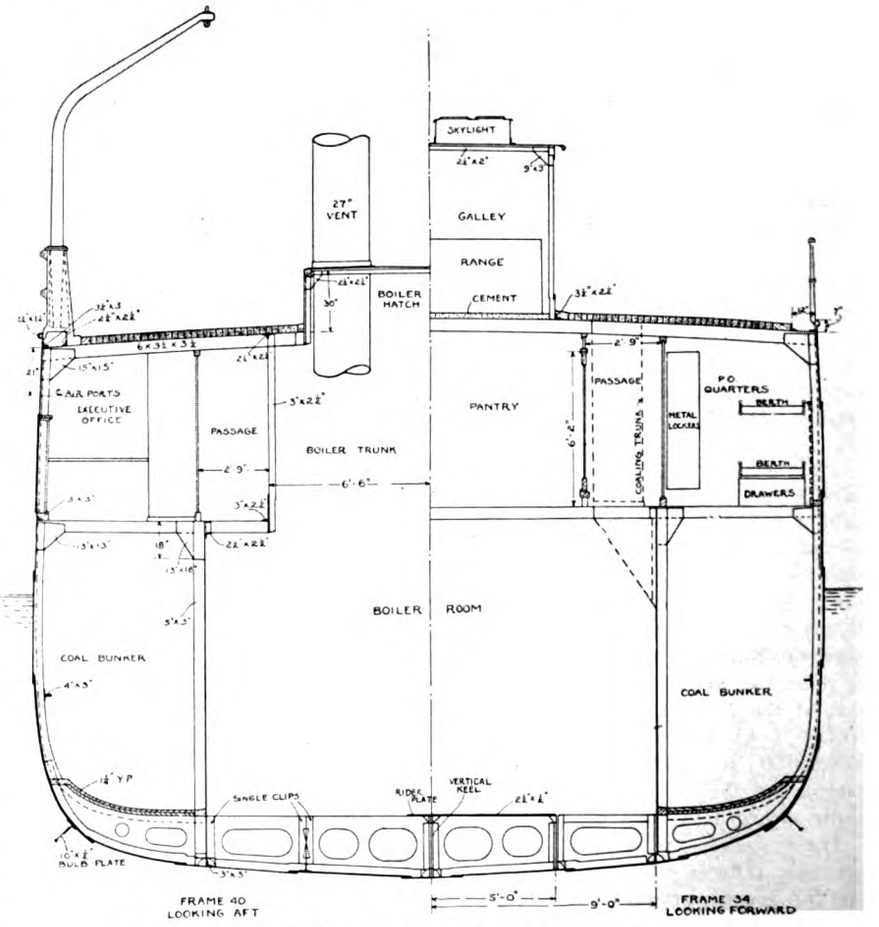
made to fit the southern vessel as an oil fuel burner. She will carry sufficient fuel oil to give her a steaming radius of over 5,000 miles.

This is a necessary feature of this vessel, as she will be employed in long cruises in the Gulf of Mexico searching for derelicts.

The contract calls for these vessels to be finished within ten months, and the active work of construction has already been commenced at the yards of the builders.

The Ross Schofield Co, 17 Battery Place, New York, recently completed the installation of the Ross Schofield system of circulation in the White Star liner Britannic. The Britannic has 24 double-ended and five single-ended boilers and 159 furnaces. The company has also secured contract from the Luckenbach Steamship Co., 8 Bridge street, New York, to equip the boilers of its entire fleet with this system.

The West Memphis Packet Co. will add a new modern excursion steamer to its fleet next spring. James Rees & Co., Pittsburgh, Pa., recently launched the vessel. She is 160 feet x 38 feet x 5 feet and will be fitted with a spacious dancing saloon.



MIDSHIP SECTION REVENUE CUTTERS NOS. 26 AND 27

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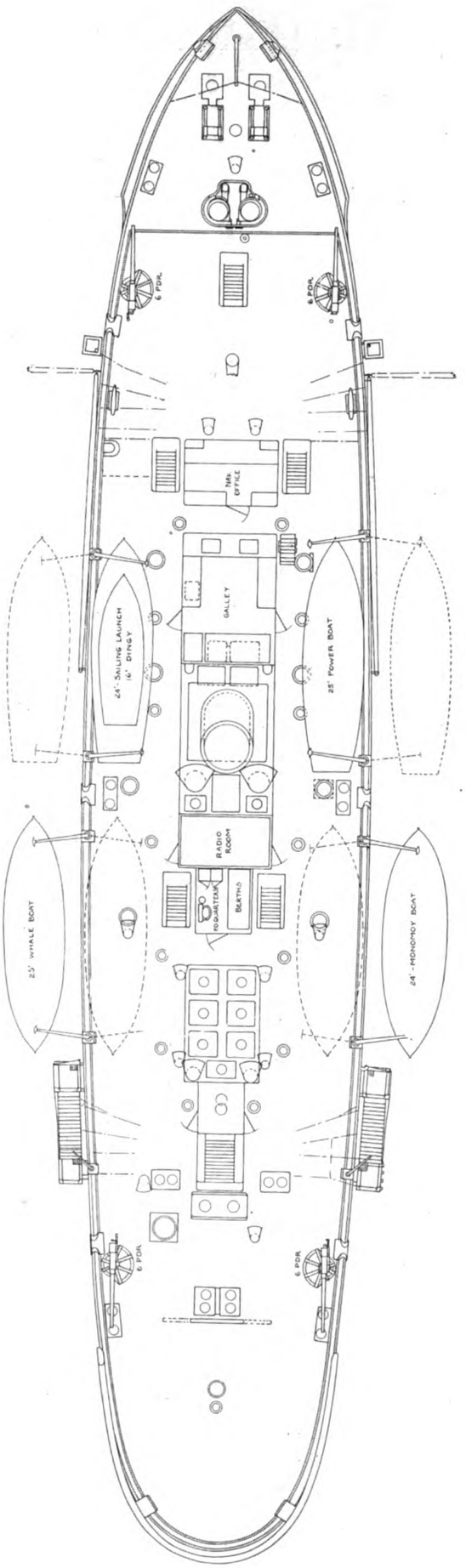

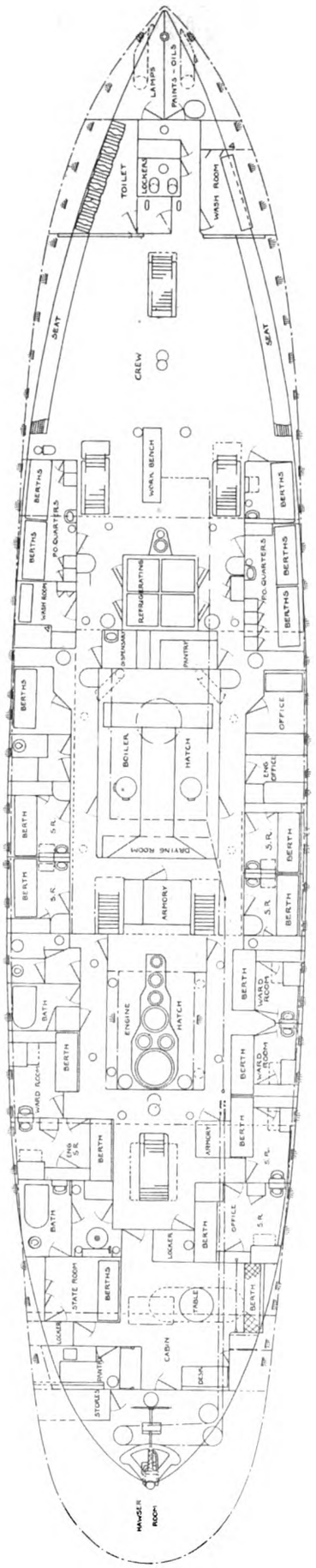

DECK PLANS OF REVENUE CUTTERS NOS. 26 AND 27

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The Port of Baltimore

The Development of Its Splendid Harbor Outlined by Its Chief Engineer.

By Oscar F. Lackey
Chief Engineer Harbor Board of Baltimore

BALTIMORE is located 14 miles from the mouth of the Patapsco river and 155 miles from the Atlantic ocean via the Chesapeake bay, being a body of water varying in width from 4 miles to 25 miles.

On either side of this body of water, conceded to be one of the most beautiful in the world, lies the rich farm lands of the states of Maryland and Virginia, which supply fresh vegetables and fruits to thousands within and without these states. This vast territory is responsible for Baltimore being one of the largest canned goods cities in the world, nor must the tobacco and grain crops be overlooked.

Of the 155 miles from the Atlantic ocean to the mouth of the Patapsco river, there are 37½ miles of an artificial or dredged channel, of a minimum width of 600 feet and a depth of 35 feet at mean low tide.*

There is no safer port in the world, nor none with greater natural advantages. Our channel bed is of such a character that once dug there is little or no maintenance. Navigators are not bothered by bad or heavy fogs, nor strong currents, the tidal flow being but 14 inches, and in the most severe winters the port is open to commerce. Owing to her labor conditions, character of bottom, small rise and fall of tide and expansive waterfront, Baltimore lends herself to development at a lower rate than does any other Atlantic port.

In the heart of what city can you buy waterfront property at $755 per front foot with a depth of 250 feet, or a fraction over $3 per square foot? This being the price paid by the city of Baltimore for the site of the Broadway pier.

Reinforced Concrete Pier

In a reinforced concrete pier just completed by the city, providing for a depth of water in the slips of 34 feet, the cost of the bulkhead work $58.50 per lineal foot, or $1.15 to $1.45 per square foot of pier. Compare these prices, if you please, with that paid by other cities, even where the construction is of a less permanent type.

Where our natural wonderful advantages are a great asset, in one sense they have been responsible for the long delay, and until recently, lack of interest in our harbor development. The people of the city of Baltimore were never called on for money for harbor improvements. Like "Topsy" it just grew. Until 1904 no systematic plan of development had even been considered and then only in a small way. This plan provided for the construction of eight municipal piers, which have been completed. After the people of Baltimore were shown the excellent results brought about by the new piers, and not until then, did they take a more generous view as to the needs of the port and endorse a more liberal policy for future development.

This opened the gates for a more thorough study of the immediate needs, and an investigation of future requirements.

After a number of plans were prepared and carefully considered, and by the process of elimination and injection, finally a general plan of harbor improvements was adopted. This plan provides:

Work Contemplated

First:—For the opening of a street 106 feet in width on a maximum 2 per cent grade, located at a distance of from 400 to 1,200 feet back of the waterfront, having a total length of 29,050 feet, or a little over 5½ miles.

Second:—For a single track municipal belt railroad with switch yards, etc.

Third:—For the acquisition of all unimproved land with riparian rights, lying between the proposed street and the waterfront, such land to be held by the city and improved as the demands may require.

Fourth:—For the deepening of the waters of the upper harbor to 35 feet.

Fifth:—For the deepening and widening of the present Spring Gardens channel to 600 feet in width and 35 feet in depth.

Sixth:—For the removal and relocation of the present old timber bridge across the Patapsco at the foot of Light street and the construction of a modern concrete structure with a double leaf bascule, giving a clear span of 150 feet.

Seven millions of dollars have been spent on harbor improvements by the city of Baltimore since 1905. Legislative authority has been secured for issuing an additional loan of $5,000,000 more, $2,000,000 of which has been ratified by the voters of the city and an additional loan of $1,500,000 is now under consideration.

Work Under Way

The completion of the first section (2,250 feet) of the marginal street, including the tracks of the municipal belt railroad.

The acquisition of all property needed for the second section of the marginal street.

The contruction of the new bridge, including approaches, and the change in direction of channel.

The following work is to be done under the new $1,500,000 loan when procured:

Completion of the marginal street and municipal belt railroad.

Deepening of the channel of the upper harbor.

Acquisition of all unimproved land and riparian rights lying between marginal street and the waterfront.

One may ask, "Why all these improvements for which the city since 1904 has spent $7,000,000? Are spending another million and propose to spend $3,000,000 more in the near future?" The question is easily answered. We expect that trade, to which by virtue of our natural advantages and geographical location, we are rightfully entitled. Look at the map of this country and you will find that Baltimore is closer by rail to the cities of the middle west than any other Atlantic seaport. Is this not an advantage? Of course it follows that Baltimore is closer to the southern ports than is Philadelphia, Boston or New York. Due to the shorter distance, Baltimore can quote lower freight rates.

I quote here a few figures, taken from the tables below, to more forcibly impress upon you the exceptional

*Paper read before the Convention of the National Association of Port Authorities, Baltimore, Md., Sept. 8, 1914.

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advantages Baltimore has due to her geographical position.

From Baltimore to Atlanta, Ga., 1st class; Baltimore, 98 cents; Boston, $1.05; New York, $1.05; Philadelphia, $1.05.

From Baltimore to Columbus, Ga.: Baltimore, 98 cents; Boston, $1.05; New York, $1.05; Philadelphia, $1.05.

From Baltimore to Pensacola, Fla.: Baltimore, 67 cents; Boston, 75 cents; New York, 75 cents; Philadelphia, 69 cents, and so on for most of the southern cities.

Now for a few figures.

On the all-rail, Baltimore to the middle west.

Chicago, Ill.: Baltimore, 67 cents; Boston and New York, 75 cents; Philadelphia, 69 cents.

Cleveland, O.: Baltimore, 45 cents; Boston and New York, 53 cents; Philadelphia, 47 cents.

Louisville, Ky.: Baltimore, 67 cents; Boston and New York, 75 cents; Philadelphia, 69 cents, and so it goes on for nearly all the middle western cities.

Passing now to South America, you will find that Baltimore via the Panama canal is 470 miles closer to Valpariso than is San Francisco, and is also 1,369 miles closer to the Panama canal than is San Francisco.

I only make these few comparisons in answer to the question, "Why spend this money on harbor improvements?" Don't you think it is only natural to suppose that these great advantages of location are going to influence the commerce of this port?

We have 120 miles of waterfront on the Patapsco river and tributaries adjacent to the channel approaches, all of which is open to development by industries needing bold water in front, high and healthy surroundings with excellent railroad connections and trolley service close by. Almost within the restricted city limits there is 37½ miles of the most desirable waterfront. Of this 31 miles are in actual use, 5 miles being owned by the city, 10.5 miles by the railroads and the balance (22 miles) by private parties or corporations.

There are 13 piers owned by the city, 50 owned by the railroads and 149 owned by private parties or corporations. The city's piers range in length from 200 to 1,450 feet, with a total area of 1,241,140 square feet, or .045 miles.

Each of the three trunk lines entering the city have spacious modern and well equipped water terminals.

The Locust Point terminal of the Baltimore & Ohio Railroad is the largest on the Atlantic coast. 3,000,000 tons of freight are imported and exported annually and thousands of immigrants are landed each year. There are 11 piers covering a waterfront of a mile, including large freight and coal piers and grain elevators of 2,500,000 bushels capacity. The aggregate floor space is about 800,000 square feet. In the freight yard of the Locust Point terminal there is nearly 80 miles of track.

The terminals of the Pennsylvania Railroad at Canton lie just opposite those of the Baltimore & Ohio Railroad, the piers, warehouses and elevators are of the usual high class. In addition to the Canton elevator of 500,000 bushels capacity, they have another one in Lower Canton of 1,000,000 bushels capacity, connected by means of elevators and conveyors to concrete storage bins of 1,000,000 bushels capacity.

The Western Maryland Railway has every facility for prompt handling of shipments at Port Covington terminal, with modern devices for coal shipments; large tracts of land have recently been bought and extensive improvements are contemplated.

The co-operation between the Western Maryland and New York Central Lines, through the extension from Cumberland to Connellsville and connecting with the Pittsburgh and Lake Erie, greatly benefits Baltimore since new tonnage is handled between Baltimore and the west under attractive conditions.

In addition to the terminals mentioned, we have those of the Canton Co. and the McLean Contracting Co., owners of large tracts of waterfront partly improved, with excellent railroad facilities.

Among the many attractive features to shippers of Baltimore Harbor are the following:

No port dues. Cheap pilotage, ranging from $3.50 per foot for vessels drawing 12 foot or less to $5.00 per foot for vessels drawing over 15 feet.

Low towage rates.

The receipt of cargoes from ships and deliveries to them from main line terminals, avoiding lighterage and handling although we have an extensive lighterage and tug service to reach ships in mid-stream and factories on the waterfront.

Rate adjustments that properly recognize our less distance between the Great Lakes and the seaboard than any other port.

Lower rates to and from the middle west.

Lower rates to and from the cities of the south than ports north of us.

Existence of waterfront storage warehouses where imported raw materials and manufactured products may be stored and certificates furnished that can be used as collateral at banks.

Municipal docks available for all classes of water traffic.

No city exceeds Baltimore in its advantageous location for the manufacture and distribution of articles made from iron or steel, brass or copper, wood, paper, clay—since raw materials can be assembled by rail or water and distributed by preferential rates to all this country and on favorable ocean rates to foreign countries.

The approximate value of the commerce of this port for 1913 from the report of Col. Lansing H. Beach, United States engineer in charge of Baltimore district, totals $440,000,000. The coastwise commerce being valued at $274,000,000.

The tonnage of the port for 1913 is estimated at 15,000,000 tons.

The manufacturing and industrial interests, which are so important to a city, have shown a wonderful increase in recent years, until today the products of these factories amount to $355,000,000 a year, which is 58 per cent of the value of the whole wheat crop on over 50,000,000 acres of land.

Passing Crude Oil

Some shipping companies are under the impression that, in order to pass a vessel loaded with crude oil, or similar products, through the Panama canal, it is necessary to first obtain permission, by cable, in advance. The *Canal Record* announces that this is not the case. In general, there is no objection to such vessels using the canal, unless some unusual condition of vessel or cargo obtains, which might endanger the canal, or interfere with its navigation, and permission for their passage will be granted on arrival at the Isthmus. Section 4 of the Executive Order, providing "Rules and regulations for the operation and navigation of the Panama canal and approaches thereto, including all waters under its jurisdiction," was introduced so that the canal authorities might have discretionary power in individual cases in passing judgment on the condition of the vessel, and the nature and location of its cargo, where such cargo consists of explosives or highly inflammable materials, etc. There has been no case to date where vessels carrying oil cargoes have been refused the transit, nor is there a likelihood of such refusal, if the ordinary precautions have been observed.

The United States Navy department has placed orders for six engines for submarines with the Busch-Diesel Engine Co., St. Louis, involving about $250,000.

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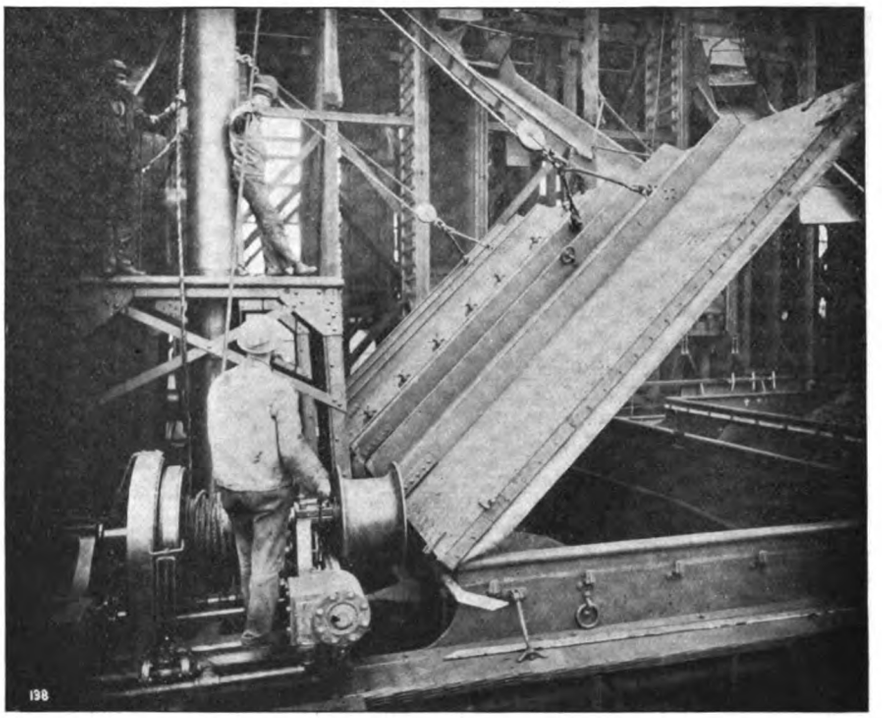
DeRusett Patent Hatch Cover

The question of the most suitable type of hatch cover is one which has exercised the attention of shipowners for many years, as it has been realized that the wood hatch covers commonly fitted are neither safe nor economical. In fact, they have a record of having been the direct cause of the loss of many a stanch vessel which otherwise could have weathered out the storm, provided, the hatch covers had remained intact. From an economical point of view, wood covers though costing less initially, in a few years far exceed what would be required for more modern methods of covering the hatch openings.

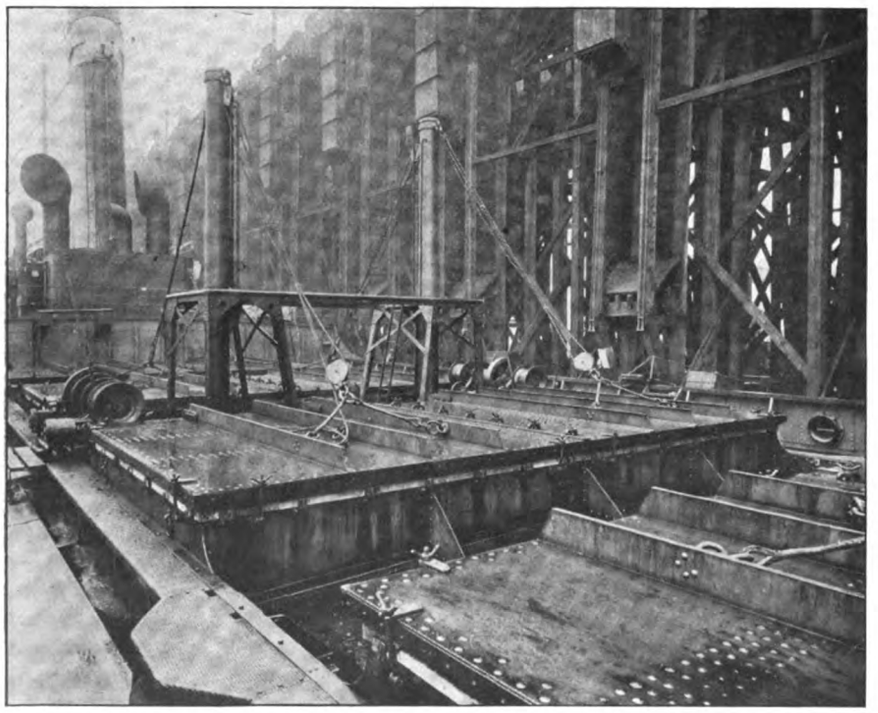
To remedy the inherent defects of wood hatch covers many schemes have been devised to design a suitable steel cover, which could not only be expeditiously and safely handled, but at the same time, would assure equal strength to resist the impact of heavy seas, that is, afforded by the decks. Many of these are well known, but all, or most of them, have serious minor defects in their design which militate against their general adoption for seagoing work.

Some years ago, however, Edwin DeRusset, the well-known naval architect of the firm Swan, Hunter & Wigham Richardson, Ltd., devised a steel cover which is as near perfect as it is possible to make one, and while readily and expeditiously handled it is absolutely watertight, and strong enough to resist the greatest masses of water ever likely to be taken on board.



DeRUSETT PATENT HATCH COVER PARTLY LIFTED ON STEAMER MELROSE

The DeRusset hatch consists in a flat steel cover stiffened on the outside by channel or bulb angle stiffeners of scantlings suited to the size of cover required. The boundary is formed by an angle bar to which a strip of three-ply waterproof canvas is secured by small bolts. The object of this strip which is only about 4 inches deep is to provide an absolutely watertight means of battening the cover when *in situ*. There is nothing novel about the battening as the strip automatically drops into place when the hatch is lowered and is afterwards secured by the usual battening iron locked in place by the ordinary oak wedge in steel battening cleats. As as additional precaution to lock the hatch in place, a drop bolt with butterfly nut is arranged at each corner and jammed down on the ordinary dogs, as will readily be seen by a reference to our illustrations. These DeRusset hatch covers are hinged either on the end or the side with specially strong hinges and are raised and lowered by a bridle span operated from the ship's winches.



DeRUSETT PATENT HATCH COVER CLOSED ON STEAMER MELROSE

DeRusset hatch covers have been generally adopted in this country for colliers and bulk freight steamers, amongst which may be mentioned the New England Coal & Coke Co.'s steamships, Everett, Malden, Melrose and Newton, the Union Sulphur Co.'s steamships Herman Frasch, Frieda and the Emery Steamship Co.'s two new vessels Atlantic and Pacific. In the case of the latter vessels the hatch covers are split on the centerline, each leaf being hinged on the fore and aft side coamings enabling the covers to hinge outboard and rest horizontally on the main rail. In addition to these vessels, this type of hatch cover has been adopted on the United States naval colliers, as well as other vessels operating on the Atlantic seaboard, and has given in every case absolute satisfaction and the cost of maintenance nil, as the waterproof covering strip lasts for many years, as even in the event of requiring renewal amounts to only a few dollars.

The DeRusset hatch cover has never been known to leak, nothing can pocket

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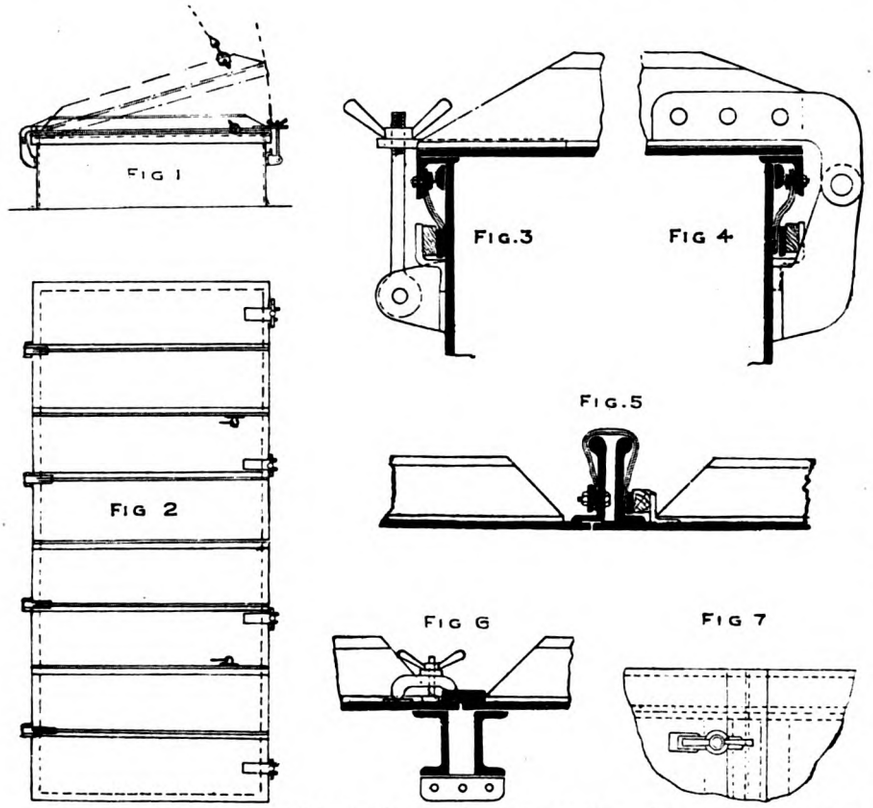
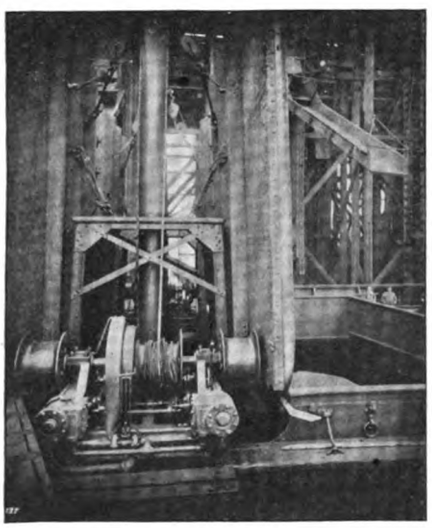


Fig. 1 an End View; and Fig. 2 Shows Plan of Cover When Closed. Figs. 3 and 4 Show the Method of Jointing the Cover by an Edge Strip of Canvas Pressed Against the Coaming by the Usual Wedge, and Batten Bars. Fig. 5 Shows How the Cover is Sometimes Jointed When Made in Two Parts, by a Strip of Canvas Secured Over the Joint by a Bar and the Usual Wedges. Another Method of Making This Joint Watertight is by Pressing a Strip of Rubber Over it as in Figs. 6 and 7. The Covers Are of Steel, Hinged or Portable, and Securely Fastened to the Coamings. They May be Lifted Either Directly Off the Mast by Span and Tackle or by Derrick.

as the strip is raised with the hatch, the ease of operation is simplicity itself and while they are slightly of increased cost to wood covers in a few years this difference will be entirely wiped out on account of the entire absence of any



DeRUSETT HATCH COVER IN UPRIGHT POSITION

cost for maintenance, whereas, as is well known, wood hatch covers are continually being lost, stolen by the firemen to light up, broken, dropped overboard, or left on dock, causing a continual expenditure for replacement. In addition to this, there is the cost for renewals of canvas tarpaulins, which is very considerable on account of the large area to be covered, whereas, as already stated, the amount of canvas required for a DeRusset hatch is infinitesimally small.

The agent for these hatch covers for the United States and Canada is Chas. Skentelbery, New England Coal & Coke Co., 111 Devonshire street, Boston, Mass.

Three-Gun Turrets

Preparations are being made at the Fore River shipyards for the installation on the new battleship Nevada for the first three-gun turret ever placed on any American warship. These turrets will be the best protected of any in the world, and they will be the heaviest ever set up, weighing on the average about 80 tons, or some 11 tons more than the turrets on the Argentine battleship Rivadavia, which was considered the "last word" in naval construction when she was laid down.

There is necessary a large amount of work before the turrets may be set in their proper places, putting in protective armor below decks for the mechanical appliances used to operate and carry ammunition to the turrets, laying the tracks on which the massive pieces of armor are moved and planing off the bottom of the turrets to get them perfectly adjusted. All of this work is well along towards completion.

Each of these turrets will have three 14-inch guns, the most powerful on any United States battleship and rivalled by a few guns in the British and German fleets. These 14-inch guns weigh on the average about 147,500 pounds, or a ton more than the Rivadavia's 12-inch pieces. The Nevada guns measure 53 feet in length, compared with 50 feet for the Rivadavia's. The American ship's ordnance is of 45 calibre, the Argentine ship's of 50 calibre. Perhaps nothing shows the superiority of the new guns more clearly than the charges they will be able to throw against an enemy, 1,400 pounds of weight and containing a much larger amount of high explosive to cause damage when it hits the mark, compared with an 870-pound projectile for the 12-inch pieces.

Two of these three-gun turrets are to be set up, one on the forecastle deck and one on the quarter-deck, with a two-gun turret behind and slightly above each. Thus there will be five 14-inch guns facing ahead and a similar number facing astern, with ability to concentrate the fire of all ten guns at either side or almost directly ahead or astern. The tremendous advantage of such an arrangement has made a deep impression on naval authorities the world over.

The New York and Texas, the only American ships in commission with 14-inch guns, carry them mounted in five two-gun turrets instead of four as on the Nevada and her sister ship, the Oklahoma, which is being constructed by the New York Ship Building Co., at Camden, N. J.

The side armor of the Nevada is well along towards all being in place, but it is figured that between three and four months more will be needed to complete this work. Owing to the fact that the Nevada will use only oil for fuel she will have but one smokestack and will be able to concentrate her boilers in the middle of the ship and afford them heretofore unknown security in the form of the heaviest armor ever employed for this purpose.

The State department has received from the British government a list of articles which have been added to the original proclamation on commodities that England considers as conditional contraband. These articles are: Copper, unwrought lead, pig, sheet or pipe; glycerine, ferro-chrome, hematite iron ore, magnetic iron ore, rubber, hides and skins raw or rough tanned, but not including dressed leather.

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Rules for Cranemen

The National Founders' Association Indicates the Precautions That Should be Taken in Operating Electrically-Driven, Cage-Operated Cranes

THE Safety First movement has attained a world-wide impetus and there is practically no industry of any magnitude that has not its safety organization. The Safety Bulletin of the National Founders' Association devotes its August issue entirely to rules for cranemen. As this is highly applicable to shipyards, the rules are published as follows:

Personal Caution is the Greatest Safeguard, after all. The careless craneman, although provided with the best facilities for safe handling of materials, may by his carelessness thwart the most careful plans of the management for the safety of its employes. Similarly, the craneman who is well meaning but not thoroughly familiar with the cause and effect of right and wrong applications of the crane mechanism, may blunder into a most disastrous accident. It is therefore imperative that cranemen should be thoroughly impressed with safe ways of handling the cranes under their charge.

Traveling cranes which are operated from a cage attached to the crane bridge are liable to cause more frequent and more serious injuries than other types because the former usually carry heavy loads at considerable speed over great areas of floor upon which employes are engaged in work. Most cage-operated cranes are electrically driven. The rules suggested in this Bulletin, therefore, are especially designed for electrically-driven, cage-operated traveling cranes.

Satisfactory crane rules are in effect in many plants, yet they differ in language and in details. A number of these have been gathered and studied, while close observation of crane hazards in all kinds of plants has suggested others. Out of this study has grown "The Fifty Crane Rules" herein suggested.

Not all of these rules, however, are applicable to every cage-operated, electrically driven crane in every plant, because of the great variety of such cranes in service and the many different conditions under which they must operate. These rules, if not adopted in their entirety, may nevertheless be used as a foundation upon which a set of rules may be formulated for each plant to suit local conditions; they may even suggest rules for operation of other types of cranes as well.

It is recommended that the rules be printed and copies posted conspicuously in each operator's crane cage and placed in the hands of all cranemen. When once adopted, the rules should be rigidly enforced.

General Rules for Cranemen

1. Cranes must be operated only by regular crane operators, authorized substitutes, crane repairmen or inspectors; no one else should enter crane cage.

2. Access to and exit from the crane cage should always be by stationary ladders, stairways or platforms provided for the purpose. Cranemen must keep their hands free when going up and down ladders.

3. Articles which are too large to go into cranemen's pockets or belts should be lifted to or lowered from crane by hand line kept in cage for such use.

4. Cages should be kept free of clothing and other personal belongings. Tools, extra fuses, oil cans, waste and other articles necessary in the crane cage should be stored in a tool box, and not left loose on or about crane.

5. A pail filled with sand should be carried in the crane cage for use in case of fire.

Rules for Crane Operators

6. Operator should familiarize himself fully with all crane rules and with the crane mechanism and its proper care. He must not tamper with any mechanical or electrical adjustment, but if adjustments are necessary, he should report the same at once to foreman or repairman.

7. Operator must not eat, smoke or read while on duty nor operate crane when he is in poor physical condition.

8. Operator must be constantly alert in watching crane and floor operations, and workmen under or near the load.

9. Operator or some one specially designated by the foreman must daily oil all working parts of crane including sheave blocks, fill empty grease cups, turn down others and make sure that oil passages are not clogged. Hoist chains and cables must be lubricated regularly as directed by foreman.

10. Operator must examine crane daily for loose parts or defects and report same immediately to foreman or repairman.

11. Operator must clean crane weekly or oftener as directed.

12. Operator must test foot brake and limit switch at beginning of each working period.

13. Operator must avoid, as far as possible, carrying loads over workmen; it must be absolutely avoided when carrying molten metal.

14. Operator must lift loads only high enough to clear safely all men and obstacles upon the floor.

15. Whenever loads are to be carried over a long distance to a high position, they should be carried as close to floor as feasible until final location is reached; load should then be lifted to desired height.

16. Operator must never go or allow any one else to go on crane bridge without first opening main switch; if crane is provided with an emergency switch, that also must be opened. Preferably, switch must be locked open, or warning sign placed and kept upon it, while any person remains on the bridge.

17. Whenever operator finds main or emergency switch open, he must not close it, even when starting on regular duty, until he has made sure that no one is on or about the bridge or runway.

18. Before closing main switch, operator must make sure that all controllers are in OFF position.

19. Operator must move controllers slowly from point to point to gradually increase speed of motors, and must restrict speed until slack in chain or cable has been taken up.

20. In case of electrical short circuit or if a controller should stick, operator must immediately throw all controllers, except the one that sticks, into OFF position, then open main switch with a rapid motion and notify foreman or repairman.

21. If power goes off, operator must immediately throw all controllers to OFF position until power is again available.

22. Operator must not run more than two motors at one time; when handling molten metal it is advisable to run only one motor at a time.

23. Operator must not reverse a motor until it has come to a full stop, except to avoid accidents.

24. Operator must pay special at-

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tention to the block when long hitches are made, to avoid tripping limit switch or running block upon the drum. When it is necessary to hoist beyond limit switch, operator must first secure foreman's approval.

25. Operator must not lift or suspend a load when there are less than two full wraps of cable or chain upon the drum.

26. Operator must recognize signals only from the one man who is supervising the lift. Operating signals should follow an approved standard; they should be manual, never verbal. Whistle signals may be used where one crane only is in operation.

27. Before starting to hoist, operator must place trolley directly over load to avoid swinging it when being hoisted. This precaution is especially important when handling molten metal.

28. Operator must not make side pulls with crane except when especially instructed by foremen.

29. Except on order of foreman, operator must not lift load when operation of controller shows that load is excessively heavy.

30. When handling maximum loads, particularly ladles of molten metal, operator must test hoist brakes after load has been lifted a few inches; if brakes do not hold, load should be lowered at once and the brakes adjusted or repaired.

31. If hoist brakes refuse to hold while crane is handling molten metal, it may be necessary, in order not to interrupt the pouring operation, to sustain load by short upward movements of hoist, to counteract settling of load.

32. Bumping into runway stops or other cranes must be avoided. When operator is ordered to engage with or push other cranes, he must do so with special care for safety of persons and cranes.

33. When two or more cranes are used in combination to lift one load, the several operators must be careful to lift load evenly.

34. When lowering a load, operator must proceed carefully and make sure that he has load under safe control at all times.

35. When leaving cage, operator must throw all controllers to OFF position and open main switch.

36. If crane is located outdoors, operator must also lock crane in secure position to prevent it from being blown off or along the track by severe wind.

37. In all doubtful cases operator should consult foreman or inspector.

38. Floorman shall give all signals to the operator in accordance with approved standards.

39. Floorman shall be responsible for the condition and selection of all hoisting accessories and for all hitches.

40. Before operator moves crane upon which empty chain slings are hanging, floorman must hook both ends of slings to block.

41. Floorman shall whenever possible walk ahead of moving load and warn people to keep clear of it. He shall see to it that load is carried high enough to clear all obstructions.

42. Floorman must notify the foreman in advance when an extra heavy load is to be handled.

43. Floorman should not himself ride or allow others to ride on hook or load except upon authority of foreman.

Rules for Repairmen

44. Repairman should have crane that is to be repaired run to a location where the repair work will least interfere with other cranes and with operations on floor.

45. Before starting repairs, repairman must see that all controllers are thrown OFF position, that main switch and emergency switch are opened and that, except for short time repairs, all fuses are removed.

46. Repairman should immediately place red flags or OUT OF ORDER signs on crane to be repaired and approved warning signs on floor beneath. Where feasible, space under crane should be roped off. If other cranes are operated on the same runway, he must also place rail stops at a safe distance.

47. Before removing any part which may release hoist block, repairman must run block to floor, or if this is not possible, he must wedge the gearing to prevent drum from unwinding.

48. When repairing runways, repairman should place rail stops and red flags at both ends of section to be repaired.

49. Repairman must take care to prevent loose parts from falling or being thrown upon floor beneath.

50. Upon completion of repairs, craneman must remove all blocking and all loose parts, bolts and tools, and put the crane in operating condition. He must then remove rail stops, red flags and warning signs and turn the crane over to operator.

Campania Closes Career

The Cunard liner Campania has closed her active career as an Atlantic liner after a continuous and highly successful running of over 20 years between Liverpool and New York. It is understood that the Cunard Line has disposed of her to Messrs. T. W. Ward, Ltd., of Sheffield, and that the old veteran of the Atlantic will end her days shortly at one of the ship breaking ports.

The Campania has carried many thousands of travelers during her trips across the Atlantic, among whom have been the illustrious of the world from both hemispheres, and she has on many occasions been in command of the commodore commander of the line.

The Campania first came on the Atlantic service in 1893, and is the product of the famous Fairfield Ship Building & Engineering Co., of Glasgow. She quickly established herself as a general favorite with the traveling public, and at one time in her history was the "record breaker" of the Atlantic before being outclassed by other ships of the Cunard and other lines. Along with the Lucania, which was destroyed by fire in a Liverpool dock some time ago, the Campania did much to enhance the prestige of the British flag of the North Atlantic. These vessels set up new records, and did the passage in little more than five days. The Cunard company have good reason to look back upon the history of the Campania and the Lucania with as much satisfaction as they can regard the earlier achievements of the Umbria and the Etruria. Some months ago the Campania was placed in the Anchor Line service between the Clyde and New York, in which she made several voyages.

The Campania is a steel twin-screw steamer of 12,884 tons gross and 5,526 tons net register, built in 1893, and is of the following dimensions:—Length, 601 feet; beam, 65 feet 2 inches; and depth, 37 feet 8 inches. Like all the steamers of the line, the Campania is fitted up with luxurious passenger accommodation, and is provided with every safeguard and comfort for travel which human ingenuity can devise.

The Union Oil Co.'s tank steamer Lyman Stewart was recently launched at the yard of the Union Iron Works, San Francisco, Cal. The new steamer is practically a duplicate of the Frank H. Buck recently launched for the Associated Oil Co., and will have a carrying capacity of about 62,000 barrels of oil. The Union Iron Works will launch a third similar vessel shortly.

The steamers City of Chester and Brandywine of the Wilson Line, Wilmington, Del., are at the yard of the Harlan & Hollingsworth Corporation, Wilmington, for a general overhauling. A new boiler will be installed in the City of Chester.

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Isherwood System of Construction

Calculation for the Neutral Axis and Moment of Inertia for the Transverse Framed Vessel

By Robert Curr

REVERTING to article 15 in which the transverse midship section is shown, I find that by careful measurement around the half girth of the section it requires 21 strakes of plating including the keel to comply with the 54-inch limit.

This increases the plating by 25 inches with a strength of 299 tons.

The narrow strakes increases the strength of the shell plating as well as makes it stiffer with the increased number of laps.

Fig. 1 shows the material which contribute to the strength longitudinally in the transverse frame vessel.

Fig. 2 shows the expanded shell plating inway of the watertight bulkhead and one frame space beyond same.

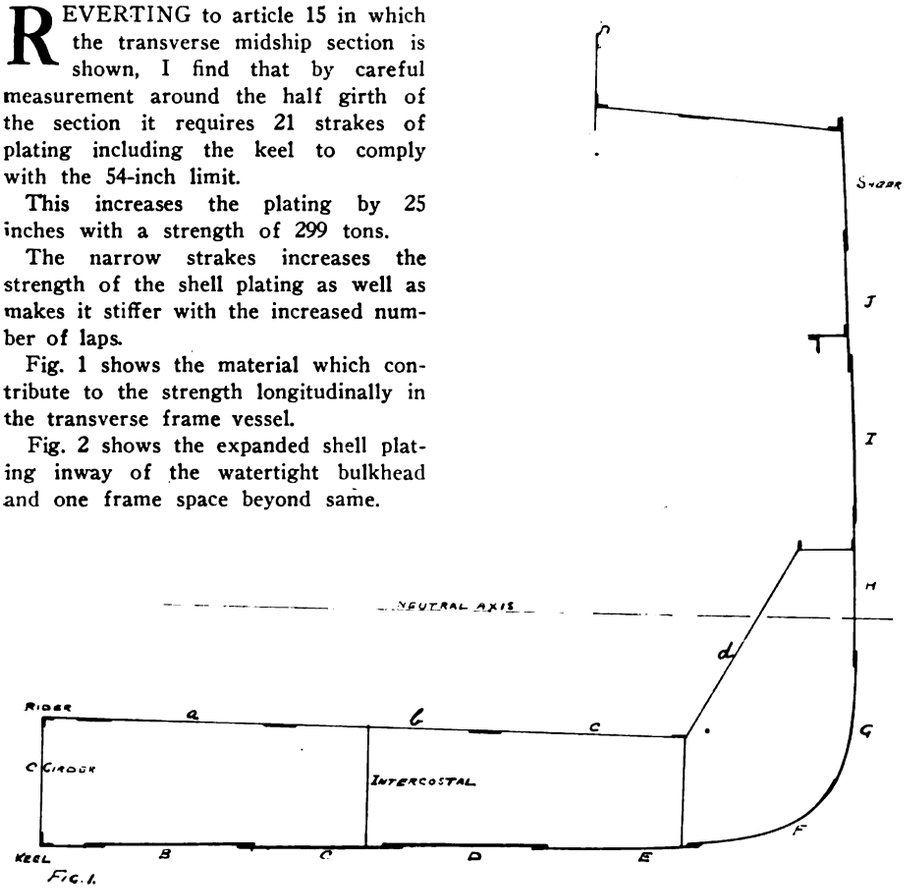


FIG. 1.

Fig. 3 is the expanded tank top and Fig. 4 the stringer plate, stringer angle and hatch coaming.

The rivets for watertight work are spaced five diameters apart center to center and the balance seven diameters.

There are 242 rivet holes across the watertight frame section and 166 at the ordinary frame or unavoidable weakest section.

The strength at the seven diameter punching is 26 tons per square inch and 25 for the other.

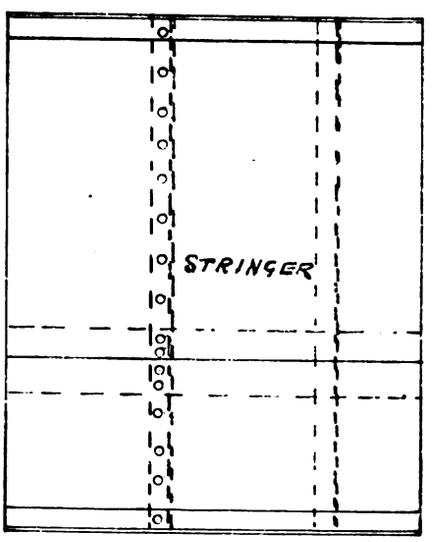
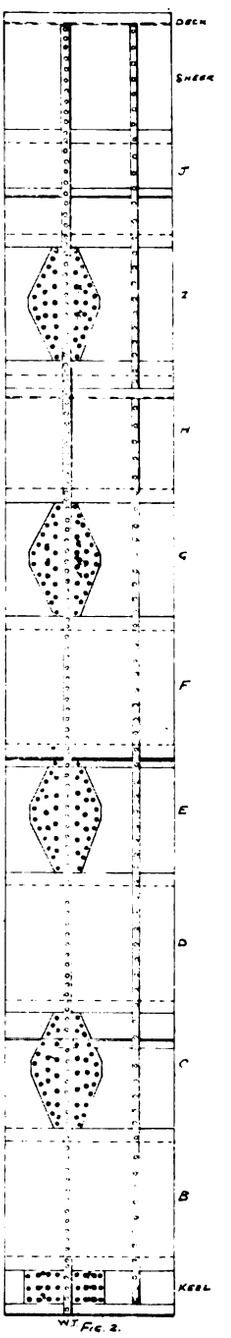


FIG. 4.



WT FIG. 2.

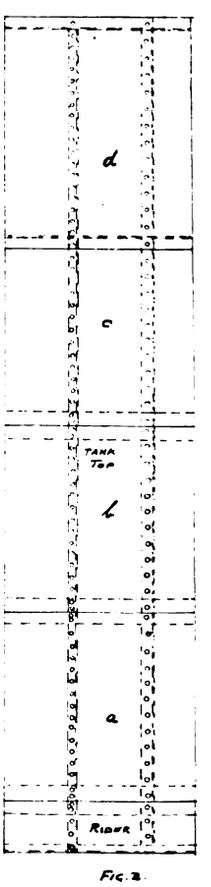


FIG. 3.

The difference is made up as shown by Fig. 2 on the outside strakes of plating. There are five doubling plates with 85 rivets ¾-inch diameter and 12 on the keel plate ⅞-inch diameter. The total strength of the rivets amounts to 1,030 tons while the difference between the

*This is the eighteenth of a series of articles on the Isherwood system of construction which began in the September 1912, issue of THE MARINE REVIEW. The first article dealt with the general specifications of the steamer; the second with the sheet, half-breadth and body plans; the third explained the method of getting the sheer; the fourth dealt with the longitudinal and transverse framing; the fifth with off-sets; the sixth with the shell plating; the seventh with the shell plating expansion; the eighth with the arrangement of plates and angles forming the spar deck; the ninth with the transverses; the tenth with bulk head construction; the eleventh with the connection of longitudinal frames to the bulkheads and transverses; the twelfth showed the interior framing between the tank top and spar deck; the thirteenth showed the amount of work that can be put together in a Great Lakes ship yard in a few hours; the fourteenth showed details of riveting in shifts of butts; the fifteenth considered the subject of butt straps and laps; the sixteenth discussed Lloyds rules and their application; the seventeenth shows certain details of the transverse and longitudinal system.

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close punched and ordinary 867 tons.

The assuming of 25 tons per square inch may be high for the close punching for watertight work but it is near enough for practical purposes.

The plating inway of the bulkhead could be made slightly thicker which would serve the same purpose as the doubling plate which will be considered later on.

The table herewith shows the calculation for the neutral axis and moment of inertia for the transverse framed vessel according to a seven diameter pitch of riveting.

Items.	Area of Section A.	C. G. above keel.	Moments.	h	h^2	Products $A \times h^2$
Keel plate	10.54	0.02	2.10	6.04	36.48	384.49
B strake	18.45	0.10	1.84	5.96	35.52	655.34
C strake	17.99	0.10	1.80	5.96	35.52	749.00
D strake	18.45	0.27	4.98	5.79	33.52	618.44
E strake	17.99	0.30	5.39	5.76	33.17	596.74
F strake	18.45	0.75	13.83	5.31	28.19	520.10
Center girder	20.70	1.50	31.05	4.55	20.70	428.49
Intercostal girder	2.30	1.60	3.68	4.45	19.80	45.54
Intercostal girder	2.30	1.70	3.91	4.35	18.92	43.51
Tank top rider	5.13	3.08	15.80	2.97	8.82	45.24
Tank top a strake	14.64	3.05	44.65	3.01	9.06	132.64
Tank top b strake	14.64	3.00	43.72	3.06	9.36	136.03
Tank top c strake	14.34	2.90	41.68	3.16	9.98	143.11
Tank top d strake	28.52	5.45	155.43	0.61	0.37	10.55
G strake	17.99	3.30	59.36	2.75	7.56	136.00
H strake	18.45	6.90	127.30	0.84	0.70	12.91
Tank margin	6.00	7.85	47.10	1.79	3.20	19.20
I strake	17.99	10.60	190.69	4.54	20.61	370.77
Side stringer	2.00	13.00	26.00	6.74	48.16	96.32
J strake	15.64	13.90	217.39	7.84	61.46	961.29
Sheer strake	16.50	16.85	278.02	10.79	116.42	1,920.93
Stringer angle	2.07	18.30	37.68	12.24	149.81	310.10
Stringer plate	25.96	18.50	482.26	12.44	154.75	4,017.31
Hatch coaming	10.80	19.50	210.60	13.44	180.63	1,950.80
	337.94		2,049.36			14,304.85

Neutral axis above keel $= \frac{2,049.36}{6.06}$

$I = \frac{569.00}{29,747.70} = 1/12 \times A \times d^2$

BENDING MOMENT $= \frac{2,162.5 \times 192}{35} = 11863.$

TENSION ON TOP $= \frac{11,863.0 \times 12.6}{29,748} = 5.02$

COMPRESSION ON BOTTOM $= \frac{11,863 \times 6.06}{29,748} = 2.41$

North Sea Closed to Commerce

Concerning the closing of the North Sea to commerce the British Admiralty has issued the following announcement coupled with instructions to merchant shipping:

"During the last week the Germans have scattered mines indiscriminately in the open sea on the main trade route from America to Liverpool via the north of Ireland.

"Peaceful merchant ships have already been blown up with loss of life by this agency.

"The White Star liner Olympic escaped disaster by pure good luck, and but for warnings given by British cruisers other British and neutral merchant and passenger vessels would have been destroyed.

"These mines cannot have been laid by any German ship of war. They have been laid by some merchant vessel flying a neutral flag which has come along the trade route as if for purposes of peaceful commerce, and, while profiting to the full by the immunity enjoyed by neutral merchant ships, has wantonly and recklessly endangered the lives of all who travel on the sea.

"In these circumstances, having regard to the great interests intrusted to the British navy, to the safety of peaceful commerce on the high seas, and to the maintenance within the limits of international law of trade between neutral countries, the Admiralty feel it necessary to adopt exceptional measures, appropriate to the novel conditions under which this war is being waged.

"They therefore give notice that the whole of the North Sea must be considered a military area. Within this area merchant shipping of all kinds, traders of all countries, fishing craft, and all other vessels will be exposed to the gravest dangers from mines which it has been necessary to lay and from warships searching vigilantly by night and by day for suspicious craft.

"All merchant and fishing vessels of every description are hereby warned of the dangers they encounter by entering this area, except in strict accordance with Admiralty directions. Every effort will be made to convey this warning to neutral countries and to vessels on the sea, but from Nov. 5 onward the Admiralty announces that all ships passing a line drawn from the northern point of the Hebrides through the Farne Islands to Iceland do so at their own peril.

"Ships of all countries wishing to trade to and from Norway, the Baltic, Denmark, and Holland are advised to come, if inward bound, by the English channel and the Straits of Dover. There they will be given sailing directions which will pass them safely, so far as Great Britain is concerned, up the east coast of England to the Farne Island, whence a safe route will, if possible, be given to Lindesnas Lighthouse.

"From this point they should turn north or south, according to their destination, keeping as near the coast as possible. The converse applies to vessels outward bound.

"By strict adherence to these routes the commerce of all countries will be able to reach its destination in safety so far as Great Britain is concerned, but any straying even for a few miles from the course thus indicated may be followed by fatal consequences."

New Type of Submersible

Messrs. Fried Krupp, of Kiel, have constructed for the Norwegian navy an interesting type of submersible named the Kobben. The dimensions of this craft are:—Length, 129 feet; breadth, 12 feet 2½ inches; draught, 12 feet 5 inches; surface displacement, 205 tons; submerged displacement, 255 tons. She is built up of two hulls. The outside hull is shaped like an ordinary torpedo-boat, and the inner hull is formed of three welded circular sections bolted together. Two reversible propellers are driven, when the vessel is cruising on the surface, by two petroleum motors of 220 engine horsepower each, and when submerged by two electric motors of 125 engine horsepower each. The surface speed is 12 and the submerged speed 9 knots. The surface radius of action is 1,450 miles at 9 knots, while under water the boat can operate within a radius of 45 miles at 6.5 knots speed.

The Kobben is fitted with a number of safety appliances. A detachable keel weighing four tons can be released by simply moving a handle. A telephone line, which can be sent to the surface by releasing a buoy, is provided, and also a high-pressure tank of 3.5 tons capacity, which can be quickly emptied by compressed air even when the vessel is at great depths.

After passing her trials the vessel was subjected to a deep-sea pressure test in the Baltic, remaining for two hours at a depth of 50 meters, after which no sign of permanent distortion could be discovered. A storm trial to test her seaworthiness was also carried out, and this showed that her high freeboard and superstructure made her an excellent sea boat in every respect.

The Lake Drummond Canal Co. has given an order to Brusstar Bros., Baltimore, Md., for a new wooden tug.

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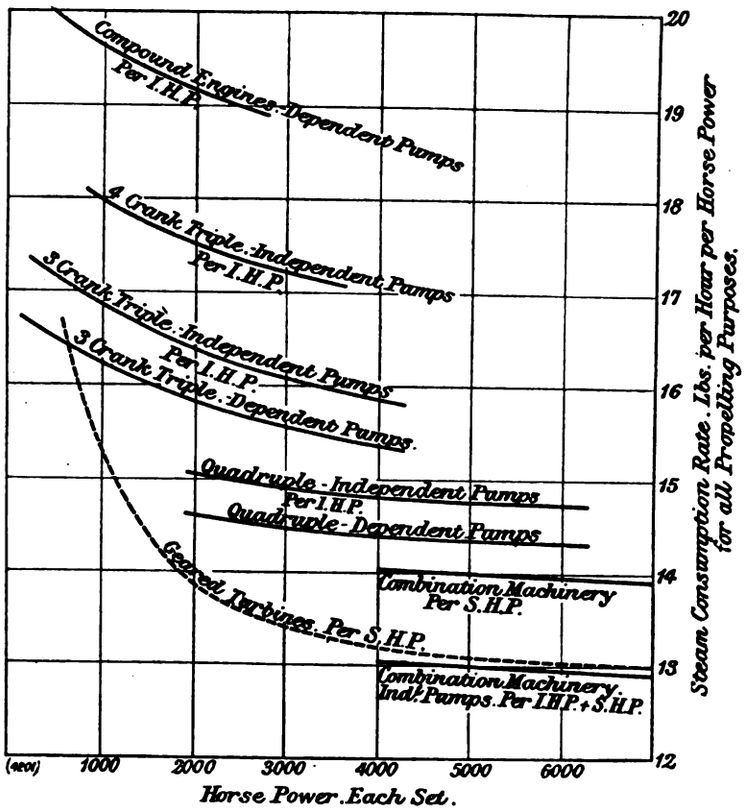
Parsons Geared Turbines

The British warship Badger, which rammed and sank a German submarine boat, is the first British warship which was fitted with geared turbines, and this "good service", to quote the admiralty telegram expressing official pleasure with the crew, as well as the general excellence of her work during the war, is further proof of the efficiency of this latest system of ship propulsion. One of the objections urged against the turbine system generally was that it did not conduce to easy handling or maneuvering of a vessel. Were further proof required to dispose of this idea, it is to be found in the operation of war vessels, not only at the "Fight of the Bight", but in ramming. Another incident of the week, indicative of the increasing favor of the system, is the successful trial of the first Atlantic liner fitted with geared turbines—the Cunard liner Transylvania. This is only another indication of the commendable enterprise shown by our premier steamship company in recent years, for it will be remembered that they were the first to place on the New York express service a turbine-driven ship—the Carmania, which, under the command of Captain Noel Grant, R. N., won such renown as an armed cruiser by sinking the Cap Trafalgar. The success of the Lusitania and Mauretania, too, has had great influence on ship propulsion. The step to the geared turbines of the Transylvania was not so momentous, since the marine installations in use or in process of construction represent collectively about 1,000,000 shaft horsepower.

The Transylvania, however, is the largest ship completed with the system. She has been built by the Scotts Shipbuilding & Engineering Co., Ltd., of Greenock, and is 567 feet in length, 66 feet 6 inches in beam, and 45 feet in depth, and has accommodation for 2,475 passengers, including 350 in the first-class and 125 in the second-class rooms. The machinery is arranged to drive twin-screws, there being for each propeller-shaft a high-pressure and low-pressure Parsons reaction ahead turbine, placed side by side, the former on the inner and the latter on the outer line, both engaging with a gear-wheel on the propeller-shaft. The size of the installation is suggested by the diameter of the gear-wheel, 10 feet, and its breadth, 5 feet. At full power the turbines run at 1,630 revolutions, while the speed of revolution of the propellers is 130 per minute, the ratio being 12½ to 1. The full power is 9,500 shaft horsepower, and the speed 16½ knots. The steam consumption of the turbines is only 11½ pounds per hour per shaft horsepower. These figures represent the maximum power without the use of the by-pass valves. Either the high-pressure or low-pressure turbines can be worked independently, the steam-leads being arranged accordingly, so that the derangement of any one turbine does not interfere with the driving of the ship by twin screws. Incorporated with each low-pressure ahead turbine is an astern turbine of Parsons impulse reaction type, of adequate power for rapid maneuvering.



Further interest in geared turbines is raised at the moment by a paper read last Tuesday at the Institute of Engineers and Shipbuilders in Scotland, by W. D. McLaren and G. M. Welsh. In it they gave outline particulars of the machinery for a number of vessels typical of various classes, and for the same ships designs, weights, etc., of geared-turbine installations were set out for comparison. In dealing with performances, actual and probable, the authors estimated the resistance, plotting curves of effective horsepower on a speed base, along with thrust delivered, shaft and indicated horsepowers and the estimated steam consumption. The data are more or less empirical, but doubtless assumed from a large mass of material in the possession of the authors. Without entering into the methods of computation adopted, it is permissible to indicate generally the deductions made as regards comparative steam consumption for different types of machinery. The authors admit the difficulties in setting out precise data, but give in the diagram annexed, Fig. 1, representative performances which may be accepted as correct within reasonable limits. They direct attention to the point that the consumption rates for engines with dependent pumps is less than for engines with independent pumps; but in the latter case the power for these auxiliaries is not recorded, and the heat in their exhausts is generally utilized for feed-heating. Compound

	Displacement. tons.	Heating surface. Reciprocating. sq. ft.	Heating surface. Turbines. sq. ft.	Weights—Reciprocating machinery. tons.	Weights—Geared turbine machinery. tons.
Channel steamer	2,030	9 900	7,890	580	470
Cargo coaster	2,020	2,130	1,930	145	152
Cargo tramp	11,900	8,200	6,610	570	500
Passenger and cargo steamer	11,520	21,520	17,540	1,280	1,030
T. S. S. liner	13,560	30,740	27,670	2,120	1,560
Q. S. S. liner*	35,500	83.850	83,850	5,550	4,200
Paddle steamer	494	4,230	3,550	240	195

*This is combination machinery against geared turbines.

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engines are assumed to work with a boiler pressure of 130 pounds per square inch, triple-expansion engines with 180 pounds, and quadruple-expansion engines with 220 pounds per square inch.

As regards the comparative weights, an advantage is proved in all cases. Some of the tabulated particulars in the paper may be summarized; in all cases the boilers are of the cylindrical type.

The reduction in heating surface in the case of turbines is indication of the economy in steam consumption, which, of course, influences the total weight of machinery from boilers to engine tunnel.

Notes on the German Navy

Beyond the broad characteristics of displacement, speed and armament, little is known as to the internal arrangement and equipment of the newer vessels in the German navy. This is due to the extreme care which has been exercised in preventing leakage of information either from the Reichsmarine Amt or from the various naval construction works, imperial and private. It is, of course, common knowledge that, apart from the three capital ships now going into commission or completing, there is a considerable gap in the forward movement of large vessels. For example, the list of battle cruisers cannot be extended until the Lutzow comes along, and this ship is very much in embryo, so much so that the Derfflinger may be regarded as completing the list of Germany's battle cruisers, which number five in all. Of these—and there are now only four, the Goeben having bolted to the Black Sea and assumed the Turkish flag—the Derfflinger is the most formidable, being engined for about 100,000 steam horse power, and armed with eight 12-inch guns. She carries in addition a heavy secondary battery, her displacement when fully loaded and equipped for action running up to approximately 29,000 tons. All the German battle cruisers now afloat are from the Hamburg yard of the Messrs. Blohm & Voss, and the propelling machinery in each case consists of Parsons' turbines on four shafts. The plan employed is no doubt generally similar to the arrangement followed in the large four-shaft British battle cruisers—*i. e.*, each pair of shafts, port and starboard sides respectively, are steamed in series, though possibly the German plan includes a connection whereby all the turbines can work in series on the lines adopted in the case of the Imperator, the Vaterland, and other vessels.

The series of German battle cruisers Moltke, Goeben and Seydlitz have ten 11-inch guns, the displacement averaging about 23,000 tons fully loaded. The Von der Tann has fewer big guns (eight instead of ten), and was the first of the large German battle cruisers. All these ships are very fast, and would be able to steam at speeds comparable with those obtained in the case of the large British battle cruisers recently completed.

Of the German battleships, the Kaiser may be regarded as representing the most powerful vessel likely to lie in line against our own ships should a fleet action take place. The Kaiser has a displacement of about 24,500 tons, carries ten 12-inch guns, 14 5.9-inch guns, and is believed to be very heavily armored. The speed of this ship is placed as high as 24 knots, and the machinery consists of three-shaft turbines, high pressure and low pressure (with astern) turbines being arranged on each line. The selection of the three-shaft plan (in preference to the four-shaft plan adopted in all turbine-driven British battleships) is doubtless due to the earlier German battleship arrangement of triple screws with reciprocating engines. The German navigating officers are accustomed to this system, though it has been said that a further season for its employment lies in the belief that with four-shafts the side wash is greater when steaming at maximum permitted speed through the Kiel Canal. The latest German battleship—the Kronprinz, launched at Kiel in February of this year and now completing—is of the same general type, and is the last German battleship which will have 12-inch guns.

Against the German battleships there are available the exceedingly formidable British vessels of the King George V class, as well as the larger battleships of generally similar type, such as H. M. S. Iron Duke. These have all ten 13.5-inch guns with a powerful secondary battery. In addition, they have the great vessels of the Queen Elizabeth class, one of which has already been commissioned. These are the fastest and most powerful battleships afloat, burn oil-fuel exclusively, and carry, as is well known, the new 15-inch guns. The British battleships are, of course, turbine-driven, and have the four-shaft arrangement, each pair of shafts (port and starboard) working in series, a method which, since the days of the Dreadnought, has given every satisfaction.

The boilers in the large German warships are mostly of the Thornycroft-Schulz type, though in the newer battle cruisers it is likely that the boilers are similar to those fitted in the Hamburg-Amerika liners Imperator and Vaterland. Many engineers will be wondering how the boilers in the German high seas fleet are getting on, since with the crowded engine-rooms which are characteristic of German naval practice, the evaporators will likely be cut down to an extent far below what is usual in the British navy. In warships, where the boilers are of the watertube type and the load rapidly fluctuates within wide limits, the condition of the feed water is of supreme importance. In filtration of salt—whether from condenser tube ends or from a priming evaporator—is dangerous, and may, indeed, prove disastrous, since if salt water gets into the boiler trouble ensues immediately, and with turbine machinery, as with other propelling engines, priming boilers are anathema.

No doubt one of the limitations of the German naval designers has arisen from the need to curtail the different types of ships and divide the vessels into fewer specific classes, each class being earmarked for a wider range of duties than the corresponding British ships. In the British navy specialisation has been developed to a high pitch, and, though this involves more ships, it also brings about a state of great flexibility when the time comes to distribute fleets for action. The German engine-rooms are accordingly more crowded, ship for ship, than are the British; and for given displacement, speed and armament the stress on the German machinery—particularly the auxiliary machinery—is greater. All this reacts upon the conditions obtaining in the case of a fleet which, like the German fleet at the present time, is lying dormant, and the process of deterioration has quite a direct influence upon eventual mobility.

A further circumstance which assists notably in the performance of the heavy task which falls now upon the British navy lies in the possession of a large number of fast armored ships driven by reciprocating engines. At low powers these vessels are relatively economical, while at the same time they can be pushed up to a comparatively high speed. Among ships of this class may be mentioned the Drake, King Alfred, and Leviathan which are armored cruisers of about 14,500 tons displacement, with twin-screw triple expansion (four-crank) engines, indicating up to about 31,000 horse power.

A further technical point which is not without significance relates to the coals used in the two fleets. The British navy has behind it inexhaustible supplies of the finest steam coal, and with moderate rates of combustion the uptake conditions are, for warships, quite good. The German coal margin is different, and is believed to comprise fuel running relatively high in ash, and distinctly smoky when worked at large rates of combustion. This is a matter of definite importance.—*Fairplay*, London.

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Foreign Built Vessels Admitted to American Registry Under the Act of Aug. 18, 1914.

Rig.	Name of Vessel.	Gross tons.	Home Port.	Owner.	Former Owner.	Former nationality.
St. s.	Oceana	7,796	New York, N. Y..	Morse Dry Dock & Repair Co...	Bermuda Atlantic S. S. Co., Ltd...	British
St. s.	Moldegaard	2,852	Wilmington, Del...	Ocean Freight Line, Inc.....	Ocean Freight Line. Inc.....	British
Bark	*Windrush	1,531	Boston, Mass.....	Shepard & Morse Lumber Co....	Windrush Shipping Co., Ltd.....	British
St. s.	Tivives	5,017	New York, N. Y..	Tivives S. S. Corporation.....	Tropical Fruit S. S. Co., Ltd.....	British
St. s.	[1]Trinidadian (tanker)...	2,450	Port Arthur, Tex..	Gulf Refining Co.....	Trinidadian, Ltd.	British
Sch.	Roseway	291	Mobile, Ala.....	Alfred L. Staples.....	Arthur Gray	British
St. s.	Santa Rosalia	5,409	New York, N. Y..	U. S. Steel Products Co.....	Isthmian S. S. Co., Ltd.....	British
St. s.	Kentra	4,682	New York, N. Y..	U. S. Steel Products Co.....	Isthmian S. S. Co., Ltd.....	British
St. s.	Bantu	4,188	New York, N. Y..	U. S. Steel Products Co.....	Isthmian S. S. Co., Ltd.....	British
St. s.	Crofton Hall	5,773	New York, N. Y..	U. S. Steel Products Co.....	Charles G. Dunn & Co., Ltd.....	British
Bark	[2]Annie M. Reid.....	2 165	San Francisco, Cal.	James Rolph Jr.....	A. P. Rolph.....	British
St. s.	*San Francisco	5,102	New York, N. Y..	U. S. Steel Products Co.....	Isthmian S. S. Co., Ltd.....	British
St. s.	*Buena Ventura	4,881	New York, N. Y..	U. S. Steel Products Co.....	Isthmian S. S. Co., Ltd.....	British
St. s.	*Charlton Hall	4,749	New York, N. Y..	U. S. Steel Products Co.....	Charles G. Dunn & Co., Ltd.	British
St. s.	*Craster Hall	4,319	New York, N. Y..	U. S. Steel Products Co.....	Charles G. Dunn & Co., Ltd.....	British
St. s.	Howick Hall	4,922	New York, N. Y..	U. S. Steel Products Co.....	Charles G. Dunn & Co., Ltd.....	British
St. s.	Zacapa	5,012	New York, N. Y..	Zacapa S. S. Corporation.....	Tropical Fruit S. S. Co., Ltd.....	British
St. s.	Cartago	4,937	New York, N. Y..	Cartage S. S. Corporation.....	Tropical Fruit S. S. Co., Ltd.....	British
St. s.	Sixaola	5,017	New York, N. Y..	Sixaola S. S. Corporation.....	Tropical Fruit S. S. Co., Ltd.....	British
St. s.	[3]Brabant (tanker).....	2,773	Port Arthur, Tex..	The Texas Company.....	Continental Petroleum Co.....	Belgian
St. s.	*Foxton Hall‡	4,246	New York, N. Y..	U. S. Steel Products Co.....	Charles G. Dunn & Co., Ltd.....	British
St. s.	Limon	3,297	New York, N. Y..	Limon S. S. Corporation.....	Tropical Fruit S. S. Co., Ltd.....	British
St. s.	[4]Panuco (tanker)	2,556	New York, N. Y..	Freeport & Tampico Fuel Oil Transportation Corp'n	Thomas Luther Evans.....	British
St. s.	[5]Pinar Del Rio.....	2,504	New York N. Y..	Amer. & Cuban S. S. Line, Inc..	Santa Clara S. S. Co.....	British
Sch.	C. W. Mills.....	371	Mobile, Ala.....	John George Murphy.....	Thomas Cunningham Thomson.....	British
St. s.	Suriname	3,274	New York, N. Y..	Suriname S. S. Corporation.....	Tropical Fruit S. S. Co., Ltd.....	British
St. s.	[6]Brindilla (tanker).....	4,170	New York, N. Y..	Standard Oil Co.....	Deutsch - Americanische Petroleum Gesellschaft	German
St. s.	Turrialba	4,952	New York, N. Y..	Turialba S. S. Corporation.....	Tropical Fruit S. S. Co., Ltd.....	British
St. s.	Metapan	5 011	New York N. Y..	Metapan S. S. Corporation.....	Tropical Fruit S. S. Co., Ltd.....	British
St. s.	Heredia	4,943	New York, N. Y..	Heredia S. S. Corporation.....	Tropical Fruit S. S. Co., Ltd.....	British
St. s.	Esparta	3,297	New York, N. Y..	Esparta S. S. Corporation.....	Tropical Fruit S. S. Co., Ltd.....	British
Ship	[7]Avon	1,573	Boston, Mass.....	Avon Shipping Co., Inc.....	Yale Shipping Co., Ltd.....	British
St. s.	Abangarez	4,954	New York. N. Y..	Abangarez S. S. Corporation.....	Tropical Fruit S. S. Co., Ltd.....	British
Bkn	[8]Everett G. Griggs.....	2 577	Seattle, Wash.....	Sterling Ship Co.....	Everett G. Griggs Ship Co., Ltd...	British
St. s.	Coppename	3,191	New York, N. Y..	Coppename S. S. Corporation....	Tropical Fruit S. S. Co., Ltd.....	British
Bark	*Snowdon	1,111	Boston, Mass.....	Snowdon Shipping Co., Inc.....	Snowdon Shipping Co., Ltd.....	British
Ship	Hilston	2,087	Mobile, Ala.....	James J. Feere.....	Hilston Ship Co., Ltd.....	British
St. s.	[9]Platuria (tanker)	3,445	New York, N. Y..	Standard Oil Company.....	Deutsch - Americanische Petroleum Gesellschaft	German
St. s.	C. A. Canfield (tank'r)	6,350	Los Angeles, Cal..	Petroleum Transport Co.....	Petroleum Carriers, Ltd.....	British
St. s.	Parismina	4,937	New York, N. Y..	Parismina S. S. Corporation.....	Tropical Fruit S. S. Co., Ltd.....	British
St. s.	Almirante	5,010	New York, N. Y..	Almirante S. S. Corporation.....	Tropical Fruit S. S. Co., Ltd.....	British
St. s.	Atenas	4,961	New York, N. Y..	Atenas S. S. Corporation.....	Tropical Fruit S. S. Co., Ltd.....	British
St. s.	San Jose	3,296	New York. N. Y..	San Jose S. S. Corporation.....	Tropical Fruit S. S. Co., Ltd.....	British
St. s.	[10]Motano (tanker).....	2,730	New York N. Y..	Standard Oil Company.....	Deutsch - Americanische Petroleum Gesellschaft	German
St. s.	[11]Caloria (tanker)	4,095	New York N. Y..	Standard Oil Company.....	Deutsch - Americanische Petroleum Gesellschaft	German
Sch.	[12]Louise M. Richard....	441	Gulfport, Miss.....	Ernest H. Richard.....	Albert Magnus Miller.....	British
St. s.	Marowijne	3,191	New York, N. Y..	Marowijne S. S. Corporation.....	Tropical Fruit S. S. Co., Ltd.....	British
St. s.	Saramacca	3,284	New York, N. Y..	Saramacca S. S. Corporation.....	Tropical Fruit S. S. Co., Ltd.....	British
St. s.	Norman Bridge	4,288	Los Angeles, Cal..	Petroleum Transport Co.....	Petroleum Carriers, Ltd.....	British
St. s.	Santa Marta	5,013	New York, N. Y..	Santa Marta S. S. Corporation...	Tropical Fruit S. S. Co., Ltd.....	British
St. s.	Carrillo	5,012	New York, N. Y..	Carrillo S. S. Corporation.....	Tropical Fruit S. S. Co., Ltd.....	British
St. s.	Pastores	7,781	New York, N. Y..	Pastores S. S. Corporation.....	Tropical Fruit S. S. Co., Ltd.....	British
St. s.	Calamares	7,782	New York, N. Y..	Calamares S. S. Corporation.....	Tropica Fruit S. S. Co., Ltd.....	British
St. s.	Tenadores	7 782	New York, N. Y..	Tenadores S. S. Corporation.....	Tropical Fruit S. S. Co., Ltd.....	British
Ship	Brynhilda	1,502	Boston, Mass.....	Brynhilda Shipping Co., Inc.....	Harvard Shipping Co., Ltd.....	British
Ship	Pass of Balmaha	1,571	Boston, Mass.....	Pass of Balmaha Ship g Co., Inc.	Ship Pass of Balmaha Co., Ltd....	British
Ship	Rhine	1,690	Boston, Mass.....	Rhine Shipping Co., Inc.....	Rhine Shipping Co., Ltd.....	British
St. s.	[13]Orleanian	2,293	New York, N. Y..	Orleanian S. S. Corporation.....	Tropical Fruit S. S. Co., Ltd.....	British
Sch.	†Glenlui	1,934	Port Arthur, Tex..	The Texas Company.....	Continental Petroleum Co.....	Belgian
Sch.	†France Marie	1,994	Port Arthur, Tex..	The Texas Company.....	Continental Petroleum Co.....	Belgian
St. s.	[14]Wico (tanker)	2,748	New York, N. Y..	Standard Oil Company.....	Deutsch - Americanische Petroleum Gesellschaft	German
St. s.	*Dochra	4,309	New York, N. Y..	Barber & Company.....	La Plata S. S. Co., Ltd.....	British
St. s.	[15]Llama (tanker)	3,189	New York, N. Y..	Standard Oil Company.....	Deutsch - Americanische Petroleum Gesellschaft	German
St. s.	Edw. L. Doheny (tanker).	6,170	Los Angeles, Cal..	Petroleum Transport Co.....	Petroleum Carriers Ltd.....	British
St. s.	[16]Sacramento	5,692	San Francisco, Cal.	Northern & Southern S. S. Co...	Hamburg-Americanische, Paketfahrt-Actiengesellschaft	German
Sch.bg.	Tuxpam	869	Port Arthur, Tex..	The Texas Company.....	Continental Petroleum Co.....	Belgian
Sch.bg.	Panuco	646	Port Arthur, Tex..	The Texas Company.....	Continental Petroleum Co.....	Belgian
St. s.	Herbert G. Wylie.....	4,292	Los Angeles, Cal..	Petroleum Transport Co.....	Petroleum Carriers	British
Bkn.	Skoda	744	Mobile. Ala.....	Charles S. Bodden.....	Lester Ashley Bodden.....	British
Bark	[17]Pilgrim	1,629	Boston, Mass.....	Pilgrim Shipping Co., Inc.....	Gael Shipping Co., Inc.....	British
Ship	Timandra	1 579	Boston, Mass.	Timandra Shipping Co., Inc....	Timandra Shipping Co., Ltd.....	British
St. s.	[18]Santa Clara	2,584	New York, N. Y..	Amer. & Cuban S. S. Line, Inc.	Santa Clara Steamship Co., Ltd...	British
St. s.	Javary	1,249	New York, N. Y..	L. C. Gillespie & Sons.....	David Hamilton Beelloch.....	British
St. s.	Charles E. Harwood...	3,178	Los Angeles, Cal..	Petroleum Transport Co.....	Petroleum Carriers	British
Bark	Anna Maria D'Abundo.	954	Mobile, Ala.....	McIntyre Lumber & Export Co..	Varian Cuthbert Scott.....	British
St. s.	Greenbrier	3,332	New York, N. Y..	Greenbrier S. S. Corporation....	Tropical Fruit S. S. Co., Ltd.....	British

*Consular certificate. †Schooner rigged. ‡Burned at Watling Island, Bahamas, Sept. 23, 1914.

[1]Formerly British St. s. (a) Augusta, (b) Cadagua. [2]Formerly British Sch. Howard D. Troop. [3]Formerly German St. s. Geestemunde [4]Formerly Dutch St. s. (a) Oevelgonne (b) La Hesbaye. [5]Formerly British St. s. Saba. [6]Formerly German St. s. Washington. [7]Formerly British ship Donolly. [8]Formerly British Bkn. (a) Lord Wolseley, (b) Columbia, (c) Lord Wolseley. [9]Formerly German St. s. Diamant. [10]Formerly German St. s. Standard. [11]Formerly German St. s. Chatham. [12]Formerly British Sch. Earl Grey. [13]Formerly British St. s. Alene. [14]Formerly German St. s. Paula. [15]Formerly German St. s. Brilliant. [16]Formerly German St. s. Alexandria. [17]Formery British Bark Gael [18]Formerly British St. s. Savan.

List complete to date, Oct. 20, 1914.

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Demand for Small Wind-Jammers

By David A. Wasson

For 25 years storm, old age and the competition of steam have rapidly decimated the fleet of small schooners in the Atlantic coasting trade. The losses have automatically created a demand until now, although the type has been branded as obsolete, the remnant in service is sure of steady and profitable occupation. That the fleet is not much smaller is due in good part to the firm of Frank S. Bowker & Son, of Phippsburg, Me., whose ship yard on the Kennebec has done more to fill gaps in the ranks than any other in the country.

Since it was established in 1890, the construction of wooden vessels has not once come to a standstill and several have often been on the stocks at one time—a record unique in so far as it concerns this class of ship. On Sept. 23, there was launched the three-master, Albert H. Willis, for Rogers & Webb, of Boston. She was the only merchant vessel launched in the Bath customs house district in 1914, and at the time was the only vessel of her type under construction in the country; although Mr. Bowker proposes to begin the construction of another like her very soon. She is of 567 gross tonnage, cost $35,000, and is commanded by Capt. Frank P. Hardy, of Bangor, late of the three-master John J. Hanson, of Portsmouth, which foundered near Bermuda last January.

The Bowker-built fleet now in commission comprises some of the best known schooners on the coast. It includes the following, of an average of 400 tons register each and a total carrying capacity of 15,000 tons; Abenaki, built in 1894; Abbie Bowker, 1890; Antoinette, 1907; Doris, 1903; Edwin G. Farrar, 1912; Edward R. Smith, 1911; Fred W. Ayer, 1903; Georgia D. Jenkins, 1903; G. J. Cherry, 1909; Griffin, 1893; Henry H. Chamberlain, 1891; Herbert May, 1906; Horace M. Bickford, 1907; John W. Dana, 1900; Madeleine, 1902; Persis A. Colwell, 1905; Richard W. Clark 1909; Seguin, 1901; Winnegance, 1890; William E. Litchfield, 1910; William H. Davenport, 1892; William M. Critchett, 1913.

Several fine schooners built by the Bowkers have come to tragic ends. The Auburn, only four-master ever built by the firm, sailed from Jacksonville, Fla., with lumber for Philadelphia, on Dec. 23, 1909, and has never since been heard from. The Frank B. Witherbee was sunk by the steamer City of Atlanta off the Carolina coast, Oct. 3, 1913. The Henry Weiler was abandoned in a hurricane off Cape Hatteras the same month. The Julia P. Cole foundered off Hatteras Jan. 21, 1910. The Kate Feore was wrecked in the Gulf of Mexico on Sept. 20, 1909, but was later floated, repaired and converted into a barge.

But a sample of the hard usage which the staunch Bowker vessels are capable of undergoing if given a chance is shown in the adventure of the William H. Davenport, one of the oldest of the fleet. While loaded with coal she hit a rock in the Piscatauqua river, above Portsmouth, N. H., in December, 1906, and sank. When the tide fell she practically broke in two, and all winter lay with the cargo in her, under ice at the bottom of the river, supposedly a total wreck. In the spring, however, she was raised and repaired, and is now in active service. An offer of $12,000 for her was lately refused.

When it is considered that the three-masters R. B. White, built by Sawyer Brothers, of Millbridge, Me., and Tarratine, built by I. L. Snow, at Rockland, Me., are the only vessels of this type aside from those mentioned above which have been added to the American merchant marine in the last four years, the service rendered by Messers. Frank S. Bowker & Son is easily appreciated.

Releasing Stranded Vessels

A new device for releasing stranded vessels has been placed on the market by Arthur E. Luzzi, of New York. It consists of a pair of stout steel columns, with a system of chains slung beneath the vessel and tackles and gear by which, through connection with the hoisting winches which are a part of every steamer's equipment, part of the load of the ship is transferred to the steel hoisting columns referred to, and which facilitates the operation of backing off the shoal or beach. The base of the columns can be adjusted to a broad footing in sand or loose material, or closed up for holding on rock bottom. The tops of the columns can be extended to suit the depth of water or height of ship. When the columns are holding as much weight as they can bear, the backing of the engines and the strain on the hawsers of the wrecking tugs is depended upon to release the vessel and float her. The device may be applied on vessels grounded head on, stern first or broadside with equal effect. The United States Salvage Corporation has been formed to exploit this invention, on which it holds an option. Offices of the company are in the Whitehall building, New York City, and it will engage in salving and wrecking along the Atlantic coast and southern waters prior to the establishment of its plant.

Value of Geared Turbines

"The exploits of the German cruisers Emden and Karlsruhe," remarked H. H. Westinghouse, president of the Westinghouse Machine Co., in his New York office, "illustrate the great importance of speed in commerce destroyers. They were too fast to be caught readily. It seems to me inevitable that in building such vessels hereafter the navy departments of the world will utilize geared turbines because of their ability to produce high speed at much less cost than possible under other styles of turbines or with reciprocating engines. A further advantage is that the economizing of space and weight required for the machinery makes it possible to increase considerably the gun power or armor protection of naval vessels. The geared turbines can also with perfect safety be started cold and brought up to full speed at once, a quality that all naval experts will recognize as of the highest importance in war vessels."

New Steel Tug Bristol

The new steel tug Bristol, owned by the Staples Transportation Co., Fall River, Mass., recently made a successful trial trip through Ambrose channel. The tug was built by the Staten Island Shipbuilding Co., Port Richmond, N. Y., is constructed entirely of steel, including her deck houses, and is 125 feet long, 24 feet 6 inches beam and 14 feet deep. Her engine is triple-expansion, having cylinders 14, 20 and 36 inches diameter by 24-inch stroke, with 650 indicated horsepower. Steam is provided by a Scotch boiler, 180 pounds steam pressure. The tug is equipped with every modern device making for safety and convenience, including Hyde steam windlass and steam steerer and Baldt stockless anchors. The compass was supplied by E. S. Ritchie & Sons, Brookline, Mass., a "Shipmate" range by the Stamford Foundry Co., Stamford, Conn., and the electric tell-tale in the pilot house, which operates the masthead, side lights and towing lights, was supplied by the General Electric Co. The Bristol will tow coal barges.

Work in the shipyards of Europe is at present almost wholly confined to the construction and completion of naval vessels, and the amount of commercial work is practically nil.

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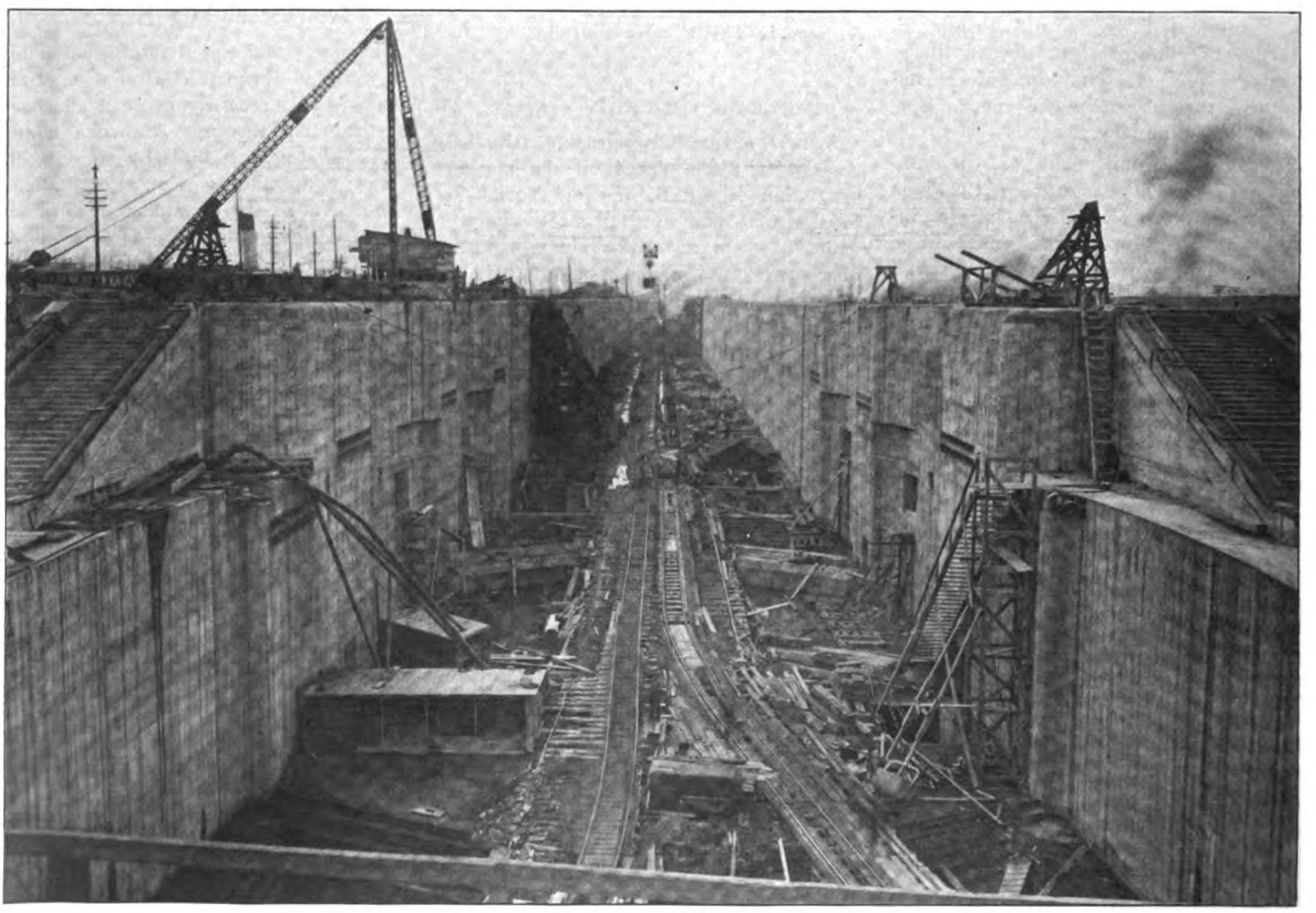
Third Lock at Sault

A Great Addition to the Navigation Facilities of the Great Lakes Goes Into Commission

THE new third lock and separate canal on the American side at Sault Ste. Marie was opened to commerce on Oct. 21st. There were no ceremonies whatever, but owing to the importance of the event to lake navigation interests, a delegation of vessel owners attended the opening. The new lock, known as the Davis lock, is 1350 feet long between gates, giving a usable length of not less than 1300 feet wth a width of 80 feet and a least depth of 24½ feet over the sill. The increased depth available through the new lock will obviate the restriction heretofore imposed on the American side by the limited depth of about 18½ feet at mean low water stages through the Poe lock and will enable vessels to pass through the St. Mary's river with a draught of 21 feet at low water, conforming to the least depth of the improved channels. The separate canal has a width of 260 feet to 300 feet.

The first appropriation for the work was made in 1907 and a cofferdam surrounding the site was completed in 1909 when a contract was let for the excavation which required two years to complete. The masonry was built in 1912 and 1913 and the machinery and gates were completed during the present year. There are two pairs of operating gates at each end of the lock to guard against accident, making the total length of the masonry 1750 feet. The side walls are 50 feet high above the floor; those at the ends forming the gate abutments are 36 feet thick and the side walls in the chambers are 26 feet thick at the base and 12 feet at the top. Under the 2-foot floor are six 9 x 10-foot culverts, aggregating 7,000 feet in length, separated by 4-foot reinforced concrete partition walls. Anchoring the culverts down are two rows of 1½-inch fox bolts 20 feet long and 4 feet apart, let into the locks 7 feet and extended upward into the partition walls. In addition a row of 1-inch bulb bars 5 feet apart anchors the culverts on the center line.

The walls of the lock rest on a Potsdam sandstone foundation and the stone used in making the concrete was obtained from the Bruce limestone quarries on the St. Mary's river 40 miles away. It was dumped into 22 feet of water and reclaimed by a whirler derrick operating a 2-yard Williams bucket dumping its load directly into Allis-Chalmers crushers as needed. The concrete was mixed in the proportion of 1 part Universal Portland cement to three parts sand and five parts broken stone. The Great Lakes Dredge & Dock Co. had the contract for this work. The walls took an aggregate volume of 1060 cubic yards per linear foot. The forms for the walls were of sheet steel 39 feet in length held in place by a mounted structural steel frame made up of four angle trusses, designed to withstand the pressures set up by the successive deposits of 40 cubic yards of concrete per linear foot. The concrete was designed to exert a hydrostatic pressure for a height of 10 feet and weigh 100 pounds per cubic foot. For maximum stresses a



MASONRY OF THIRD LOCK. GENERAL VIEW LOOKING WEST ON NOV. 6, 1913

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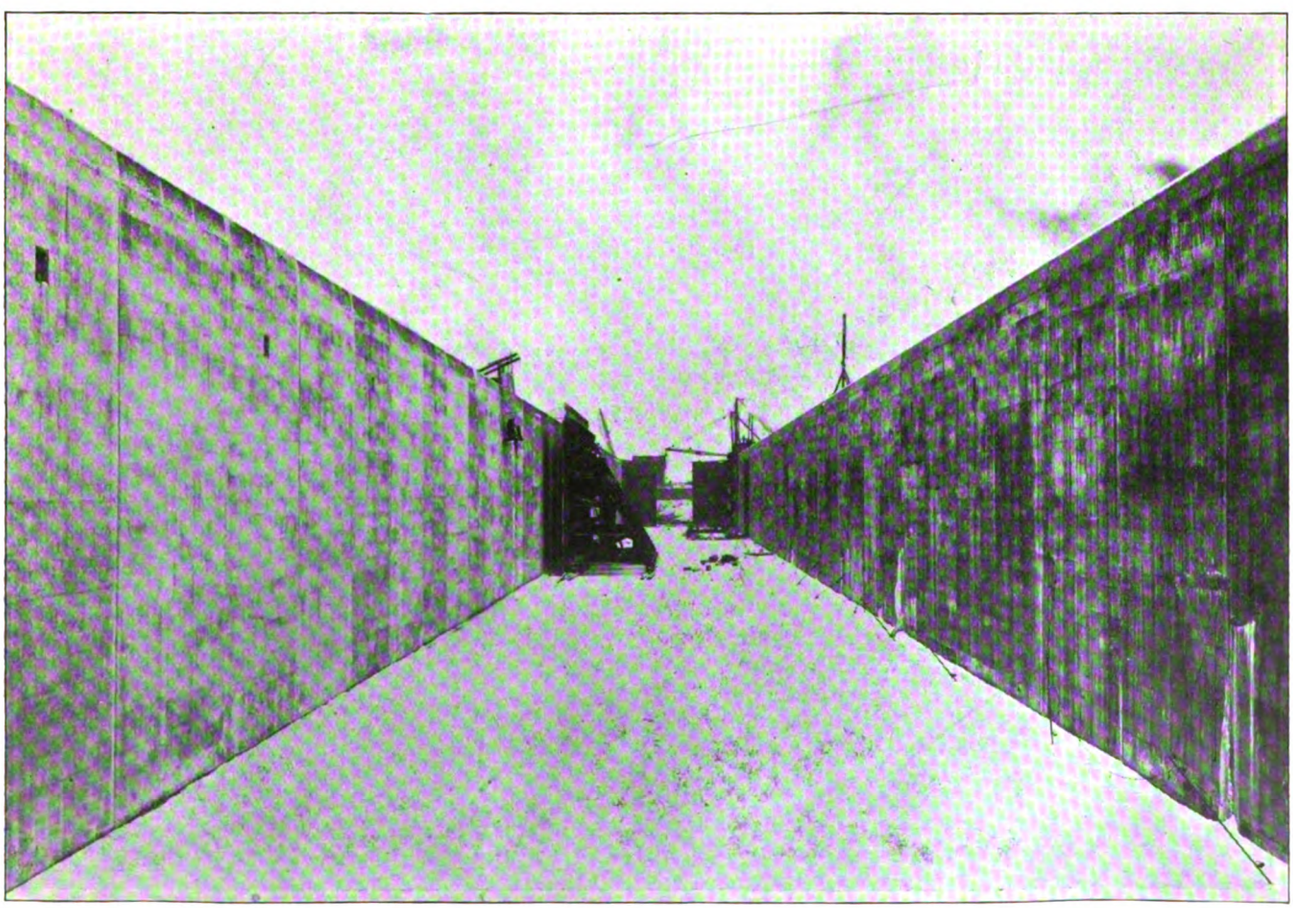
THE FIRST UP-BOUND LOCKAGE IN THE THIRD LOCK. A FLEET OF GOVERNMENT TUGS IN THE FOREGROUND AND THE BULK FREIGHTER A. C. DINKEY OF THE PITTSBURGH STEAMSHIP CO.'S FLEET IN THE BACKGROUND



GENERAL VIEW OF THIRD LOCK CHAMBER LOOKING EAST FROM MITER WALL, JAN. 7, 1914

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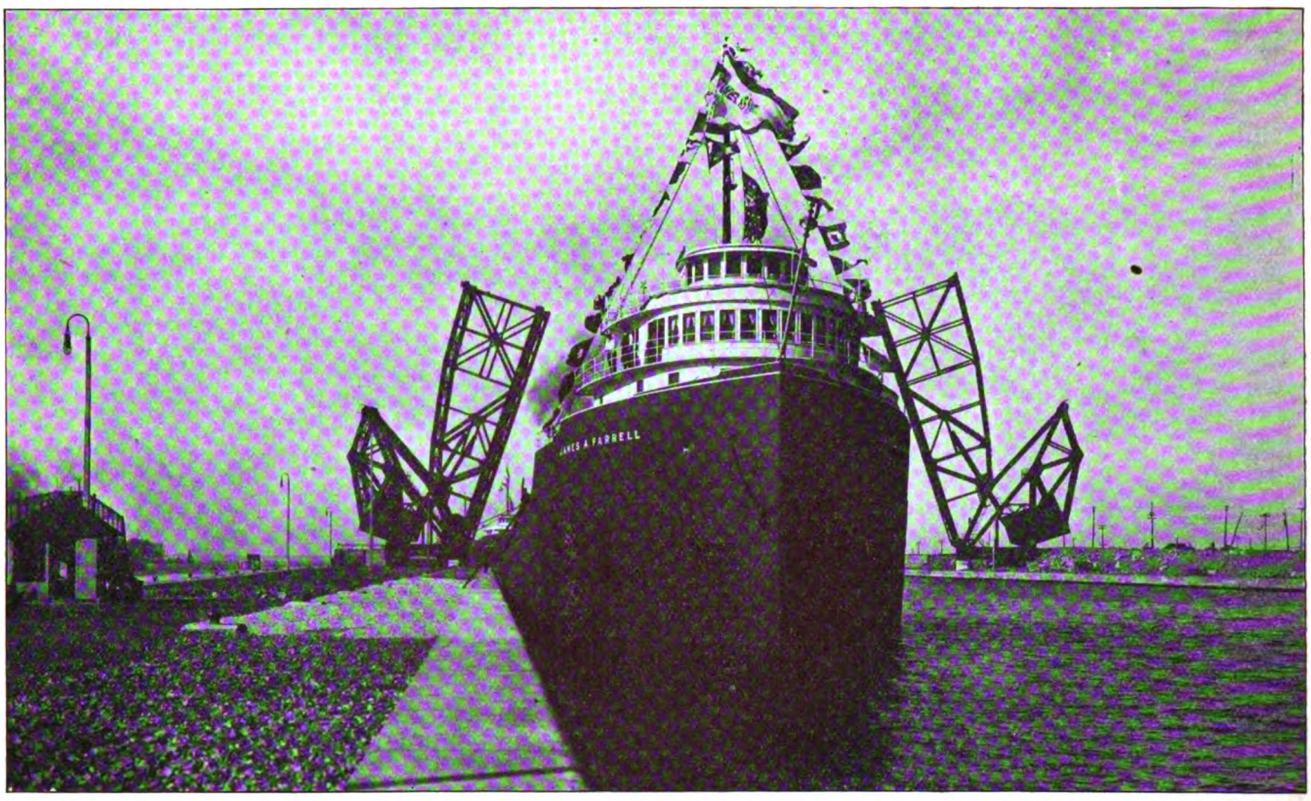
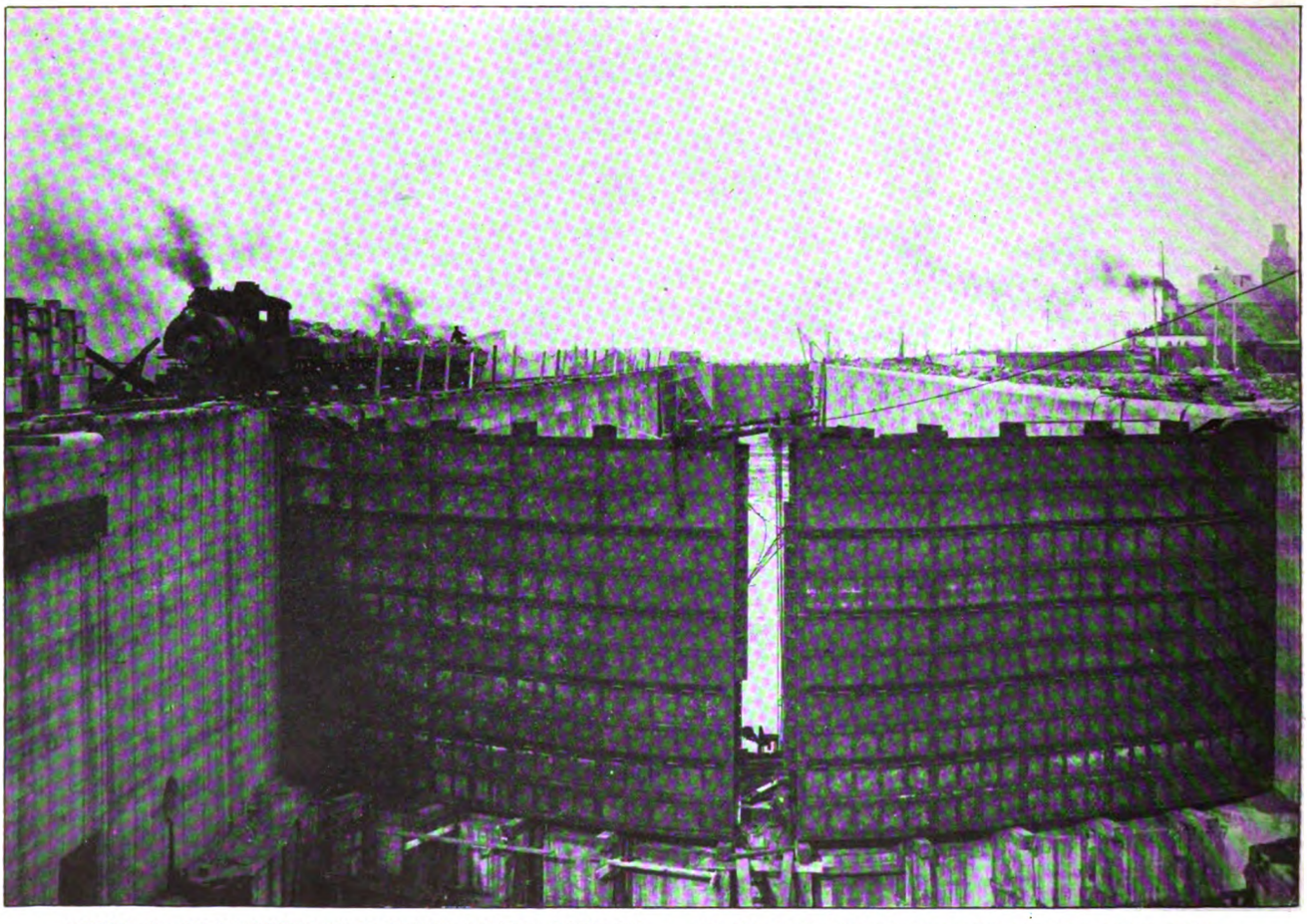


THE BULK FREIGHTER JAMES A. FARRELL IN THE NEW CANAL. THE NEW STRAUS BASCULE BRIDGE IS IN THE BACKGROUND



THIRD LOCK LOOKING EAST FROM GUARD GATE NO. 1. BACK FILL BEING DUMPED FROM NORTH WALL, MAY 18, 1914

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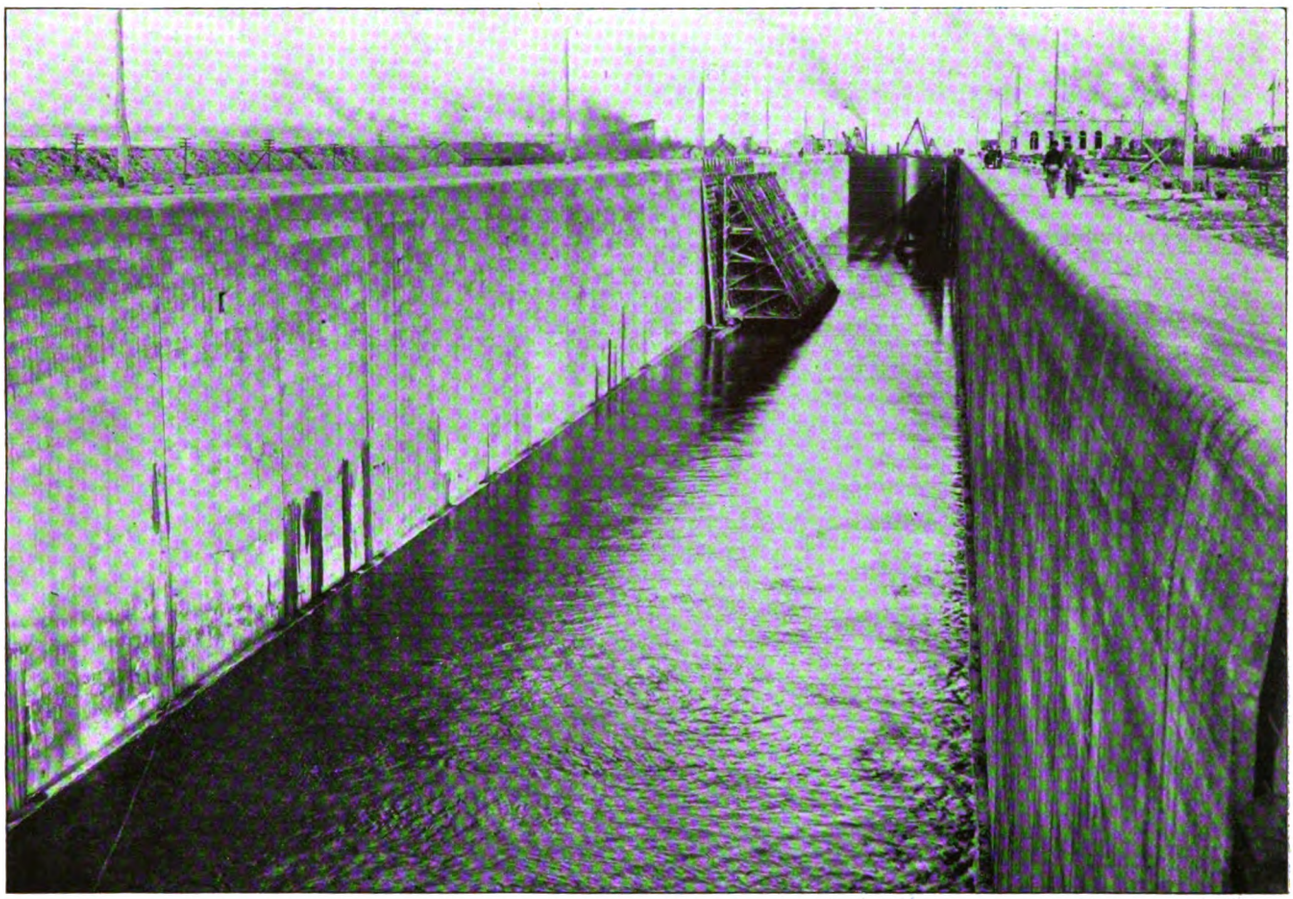

GENERAL VIEW OF THIRD LOCK LOOKING EAST FROM GATE NO. 3. FIRST FILLING OF LOCK OCT. 2, 1914

THE FIRST DOWN-BOUND LOCKAGE IN THE THIRD LOCK. STEAMERS RICHARD TRIMBLE AND JAMES A. FARRELL OF THE PITTSBURGH STEAMSHIP CO.'S FLEET LOOKING FORWARD

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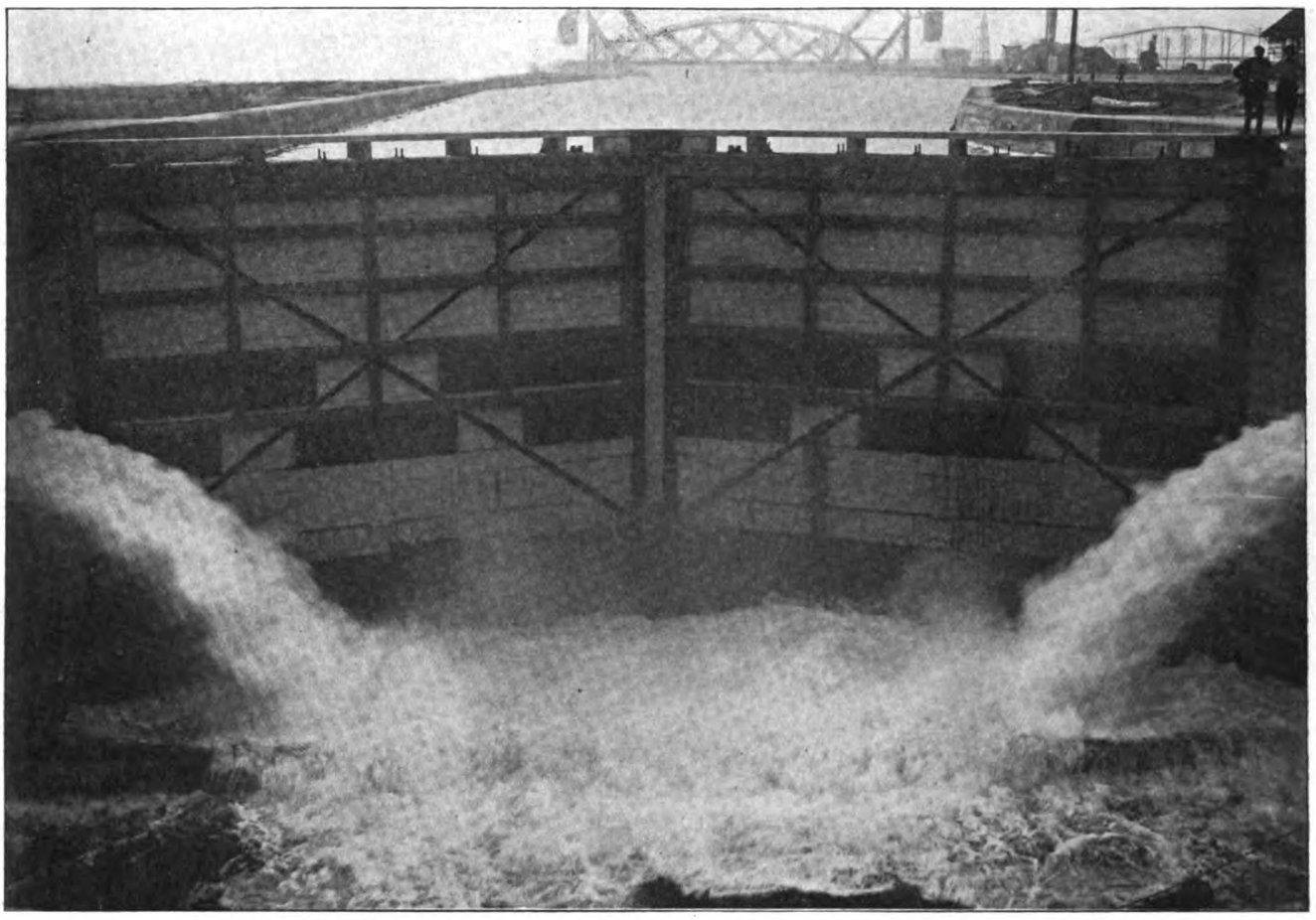
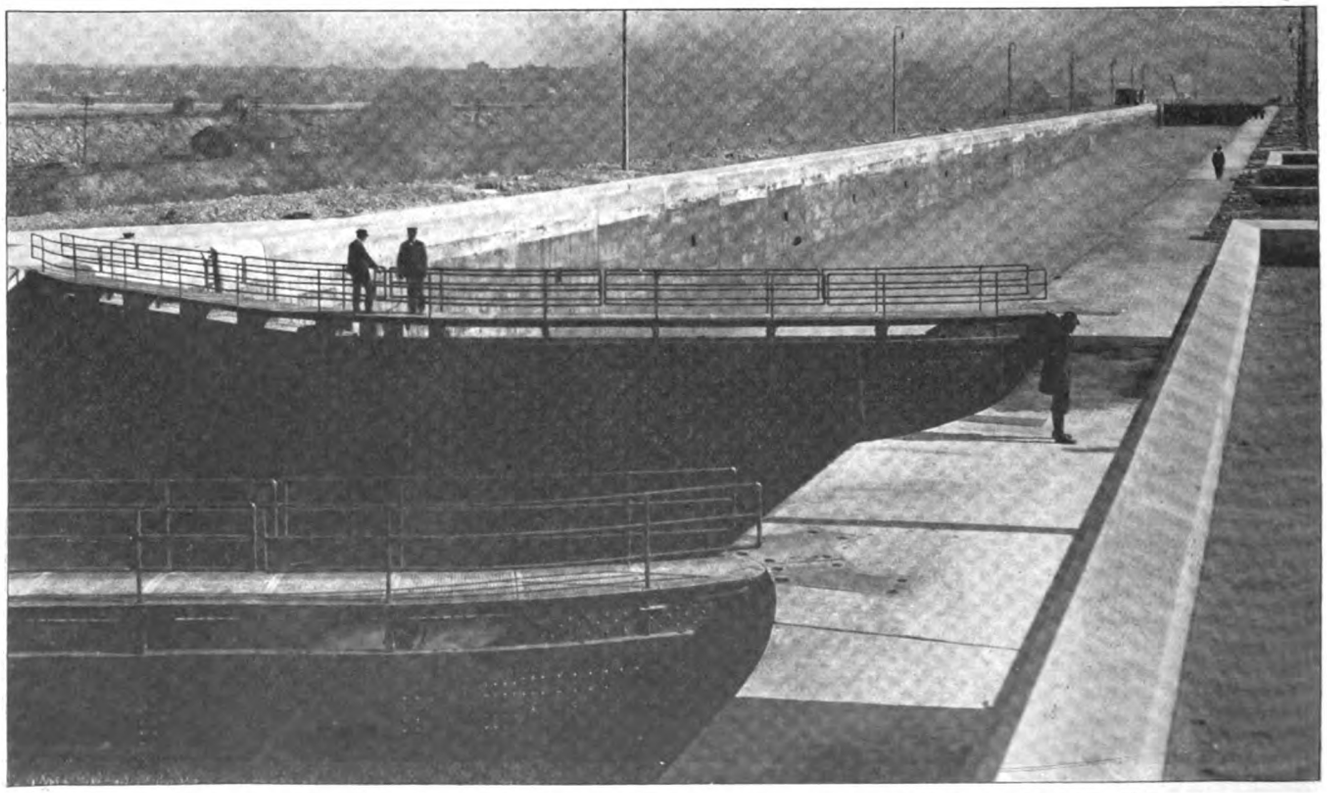


FOREBAY FILLING VALVES OF THIRD LOCK. FIRST OPERATION OCT. 2, 1914



GENERAL VIEW OF THE THIRD LOCK FROM THE UPPER END, TAKEN ON OCT. 21, 1914

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Reading from left to right: Harry Coulby, president Pittsburgh Steamship Co.; William Livingstone, president Lake Carriers' Association; Harvey D. Goulder, counsel Lake Carriers' Association; John Craig, of Toledo; W. P. Snyder Jr., Pittsburgh; L. C. Waldo Detroit; C. J. Peck, Cleveland; C. H. Westcott, Detroit; W. A. Livingstone, Detroit; George Marr, secretary Lake Carriers' Association; George H. Barbour, Detroit.

wind pressure of 20 pounds per square foot in either direction was added to the concrete pressure.

The four pairs of operating gates are of steel and the two pairs of guard gates for unwatering the lock when necessary, are of western fir. The machinery is operated electrically. This new lock will accommodate two of the largest lake steamers with one operation and will relieve the Canadian lock of much of its work. The deepest draught vessels of late years have usually sought the Canadian lock, as the available depth in that lock was somewhat greater than that obtaining in the Poe lock owing to the practice of flooding the vessel out. The new lock can be filled or emptied in a little more than six minutes.

The first craft to pass through the new lock upon its formal opening was the United States steamer Gladwin, the inspection steamer of Col. Mason M. Patrick. The Gladwin was followed by the United States steamer Alfred Noble, the United States Revenue Cutter Mackinac and the tugs L. C. Sabin, S. C. Schenck, Illinois and James Edwards, upbound. These were followed by the bulk freighter Alva C. Dinkey, 600 feet long and 58 feet beam. After these steamers had been locked through, upbound, the bulk freighters James A. Farrell and the Richard Trimble, loaded with iron ore, passed down. The Farrell had 11,745 tons aboard and the Trimble 11,711, a total of 23,456 gross tons.

Among the vessel men who attended the opening were William Livingstone, president of the Lake Carriers' Association; Harry Coulby, president of the Pittsburgh Steamship Co.; Harvey D. Goulder, counsel of the Lake Carriers' Association; George A. Marr, secretary of the Lake Carriers' Association; Geo. Steinbrenner and C. J. Peck of Cleveland; John Craig, Toledo; George H. Barbour, William A. Livingstone, L. C. Waldo and Capt. C. H. Westcott of Detroit and William P. Snyder Jr. of Pittsburgh. Col. Mason M. Patrick, district engineer at Detroit; Col. James G. Warren, district engineer at Buffalo and Supt. L. C. Sabin at Sault Ste. Marie represented the American government.

The Great Lakes Dredge & Dock Co. had the contract for the lock and masonry and for the east canal. McArthur Bros. Co. of Chicago had the contract for the west canal. Other contracts were as follows: Penn Bridge Co., Beaver Falls, Pa., lock gates; Alberger Pump & Condenser Co., New York, pumping plant; J. B. Milholland Co., Pittsburgh, machinery and valves; the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., arc lighting systems; John Schroeder Lumber Co., Milwaukee and McCormick Lumber Co., McCormick, Wash., fir timber.

Sudden & Christenson, 110 Market street, Seattle, Wash., operating a fleet of six steel lumber steamers, have entered the intercoastal trade between Pacific and Atlantic ports.

The United States civil service commission announces an open competition examination for mechanical engineer assistant for experimental work in marine engineering at the United States naval academy, Annapolis, Md. Application forms may be secured from the commission at Washington.

Capt. Charles Thompson, formerly United States assistant local inspector of steamboats in the Boston district, has been appointed traveling inspector of the steamboat inspection service. He will investigate and report conditions in all ten districts that should be called to the attention of the head of the steamboat inspection service at Washington.

Messrs. Gielow & Orr, New York City, have designed a houseboat for Mr. Payne Whitney of that city, to be built by the New Jersey Dry Dock Co., Elizabethport, N. J. The new craft will be 130½ x 21 x 4 feet and will have a deck house 62 x 13½ feet, in which will be located the main saloon, chart room, dining saloon, pantry, etc. The owners' and guests' quarters will be in the forward part of the vessel. Two 200 horsepower Winton gasoline engines will furnish propelling power, giving her a speed of 14 miles per hour. Tanks will be fitted capable of carrying 6,000 gallons of gasoline.

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Pollution of Lake Water

The International Joint Waterways Commission is Now Considering the Subject From All Angles

THE International Joint Waterways Commission met in the Federal building, Detroit, on Tuesday, Nov. 10, to consider the pollution of boundary waters by vessels and to provide, if possible, a remedy therefor. During the past two years a corps of experts under the direction of Dr. Allan J. McLaughlin has made a detailed study of lake water, having analyzed some 17,000 samples taken from over 1,700 points from the head of the lakes to the outlet into the St. Lawrence river. The result of these findings was published in THE MARINE REVIEW of February, 1914, and indicates that the lakes are polluted for a considerable distance off the shores of the leading cities, as well as in the connecting rivers. The great bulk of the water in the open lake, however, remains in its pristine purity and the very clear indication of these areas in the report is of great value to vessel owners.

Samples taken in the rivers tend, in the opinion of Dr. McLaughlin's experts, to show that the vessels were responsible for a certain part of the pollution and it was to investigate this feature that the International Joint Commission invited the Lake Carriers' Association and the Dominion Marine Association to submit arguments in rebuttal.

The Lake Carriers' Association was represented at the hearing by President William Livingstone, Secretary George A. Marr, A. W. Thomson of Cleveland and Prof. H. C. Sadler of Ann Arbor University. The Dominion Marine Association was represented by J. W. Norcross of Toronto, A. A. Wright of Toronto and Francis A. King, secretary, of Kingston, Ont. The American members of the International Joint Commission are James A. Tawney of Minnesota, Obadiah Gardner of Maine and R. B. Glenn of North Carolina. The Canadian members are Th. Chase Casgrain, Henry A. Powell of St. John, N. B., and Charles A. McGrath of Ottawa All were present with the exception of Th. Chase Casgrain who has just been appointed postmaster general of Canada. Mr. Tawney presided.

President Livingstone informed the commission that insofar as the Lake Carriers' Association is concerned it would do everything in its power to cooperate with the Commission because he felt that no commercial interest should stand in the way of the general health. He added, however, that he did not know exactly what was required of the Association because the pollution caused by the municipalities preponderated so enormously that anything the vessels might do would be of no avail whatever so long as the cities were permitted to discharge raw sewage into open water. In answer to the question, President Livingstone stated that it was the invariable custom in so far as he knew for vessels to discharge sewage overboard untreated. On the question of water ballast President Livingstone stated that many of the modern carriers had to make the trip up the lakes light and were therefore compelled to carry several thousand tons of water ballast in their water bottoms and side tanks to make them manageable. This water was frequently let into the ship shortly after leaving port and the practice was usually followed of pumping it out an hour or two before she reached the loading port in order to get the vessel in proper condition for loading. Weather conditions obviously had a great deal to do with the subject. No modern bulk freighter could leave port in light condition against a beam wind without water ballast as the tug could not hold her. In reply to the question as to whether waterworks intakes were respected, President Livingstone replied that a special circular had been issued to all the vessels of the Association not to pollute the water within a radius of four miles of the Detroit waterworks intake, and that there is no reason why such a rule should not become general in respect to all intakes.

He added that the Lake Carriers' Association had defined the areas in the great lakes from which supplies of water might be drawn for drinking purposes aboard ship and that these areas were based upon the findings in Dr. McLaughlin's report. He was not aware of any outbreak of typhoid fever on any of the ships belonging to the Association. In closing he assured the commission that the Lake Carriers' Association would go to any reasonable length to safeguard health in the treatment of sewage aboard ship and the discharge of water ballast and would assist the government in every way in bringing about a satisfactory remedy, suggesting that if the government experts desired to experiment with tank installations, the Association would be glad to turn over to them as many ships as they required for experimental purposes. He did not think that the vessel owners themselves should make installations which might after all prove not to be satisfactory to the general government.

In this connection Mr. Powell announced that the public health service is now experimenting with a tank installation in which the sterilizing agency is live steam. He added that it had lately been installed on a boat and that if it works out well it will be found to be a very inexpensive outfit.

President Livingstone closed by submitting several circulars on drinking water and sanitation in general that were issued by the Association last spring. He also made it very clear that while lake vessels carried throughout the season a floating population of about 15,000,000, it really meant very little when contrasted with the permanent population along the shores of the lakes. In fact these 15,000,000 passengers can only be regarded as so many passenger hours. Granting that each passenger spent five hours on the water, it would work out into a permanent population of about 10,000 and even these would be scattered over a territory of nearly 1,000 miles in length. Any pollution that is subject to the rectifying influence of 1,000 miles of motion, fresh air and sunlight can amount to very little, if anything at all.

Francis King, secretary of the Dominion Marine Association stated that the attitude of his Association was to do all that could be done and it would be governed by anything that the commission recommended as practicable. He was perfectly satisfied in his own mind, however, that the vessels were guilty of only about one-five hundredth of the pollution to which the lakes are subject and that nothing whatever would be accomplished by eliminating this practically infinitesimal fraction unless the great offenders were also eliminated. He added that no system would be practicable aboard ship that did not have installations both forward and aft.

One of the commissioners intimated that the lanes upon which the vessels traveled were polluted at certain points by the vessels themselves. He must have had in mind converging tracks, say at the foot of Lake Huron, or in Whitefish Bay, because the actual lanes in open water are several miles wide. This point was picked up by J. W. Norcross and commented upon in his tes-

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timony. He said that the up and down lanes are too extended to suffer any notable pollution. Taking up the subject of water ballast as a practical navigator he stated that it was essential that a modern vessel of 10,000 tons, if she was light, should have ballast. In a great many cases they can discharge ballast outside well beyond any possible point of contamination of the waterworks intakes, but he added that some of the vessels must actually carry their water ballast into port in order to get under the machines. He estimated, however, that about two-thirds of the vessels do not require ballast of any kind as they usually go up loaded with coal. In a strong wind it is absolutely necessary for safety and to make the ship manageable that ballast be taken on before leaving port, but it does not follow that this ballast is carried to the point of destination. Sometimes vessels leave with ballast and then if weather conditions are favorable, pump it out in open water as they can make better time without it. They may fill again in the open lake if weather conditions make it prudent to do so. Regarding drinking water he said that his ships' tanks were filled from areas that had been proved to be pure by the board of health. His testimony was very simple, direct and convincing.

A. A. Wright stated that even if the vessels treated their sewage before discharging it overboard, it would have no appreciable effect upon the purity of lake water, as the great sources of contamination are elsewhere. He felt, however, that if the municipalities treated their sewage before discharging it into open water, it would unquestionably be the duty of vessel owners to also sterilize their sewage. There were, however, in his estimation, practical obstacles in the way of doing so and he thought the commission should have its experts experiment with the problem. For instance, on the lakes there is a certain period of time in which the vessels have to operate when the weather is anywhere from zero to 25 degrees below zero, and that any tank in the forepeak would undoubtedly burst under such conditions. He did not regard the physical obstacles, however, as insuperable, but he did think that the government should submit a system of sterilization that would be satisfactory to it. He added that he would be willing to let the experts of the commission have three or more of his boats to try any experiment out on.

"It is you who are the offenders," said Mr. Powell, "why should the government experiment?"

"Nowhere," replied Mr. Wright, "is freight carried as cheaply as it is on the Great Lakes and the whole country gets the benefit of it. We cannot afford to experiment with things that may not meet with the approval of the government."

A. W. Thomson of Cleveland closed the testimony. He said that if the evidence submitted by the government was analyzed it would be found that the pollution caused by the vessel itself was practically nil, as the tendency of nature was to rectify it before it could get to any possible source of human consumption.

President Livingstone of the Lake Carriers' Association gave a dinner at the Detroit Club on Tuesday evening to the members of the International Joint Commission and to the representatives of the Lake Carriers' Association and Dominion Marine Association present. Covers were laid for 12 and the occasion was one of extreme enjoyment. All of the members of the commission are men who have distinguished themselves in other walks of life. Mr. Glenn, who was formerly the governor of North Carolina, is a story teller of rare quality, while Mr. Powell has achieved for himself an enviable reputation in the Chatauquas. It can well be imagined that the evening was one out of the ordinary.

Waterway from Chicago to Illinois River

Governor Dunne of Illinois has received a report from the board of engineers appointed to define a practical waterway from Chicago to the Illinois river at LaSalle, Ill. Three routes are recommended in the report, one to cost $6,132,000, another $2,944,000, and the third $3,075,000. The last is recommended.

The project that is favored involves the following engineering work: Deepening of the Illinois river from LaSalle to Starved Rock; construction of a lock and dam in the Illinois river at Starved Rock; construction of a connecting channel and lock between the Illinois river and the Illinois and Michigan Canal at Walbridge Creek below Marseilles; construction of a crib dam in the Illinois river just above Marseilles and a connecting channel and lock between the Illinois and Michigan canal and the Illinois river at that point; construction of a connecting channel and lock between the Illinois river and the Illinois and Michigan canal at a point just below Dresden; deepening of the bed of the Illinois and Michigan canal and the construction of new locks from Dresden to the southern terminus of the drainage canal at Joliet and construction of a new lock at the sanitary district power house at Lockport.

The project provides for a navigable depth of 8 feet, and for the utilization of the Illinois river as a waterway for 45 miles of the total distance of 65 miles from Joliet to LaSalle. This route was selected as lending itself to future progressive development. The engineers who made the report are: Lyman E. Cooley, consulting engineer of the board; E. J. Kelley, assistant chief engineer of the sanitary district of Chicago; Walter A. Shaw, member of the Illinois Public Utilities Commission, and LeRoy K. Sherman, member of the Illinois River and Lakes Commission.

River Pollution

Hinging on the outcome of a federal suit against the Sanitary District of Chicago, which if successful would restrict the amount of water taken from Lake Michigan, is the expenditure of more than $500,000 for sewers or disposal plants to care for the sewage of Maywood, Melrose Park, River Forest and Forest Park. These are all high-class residence towns, having a combined population of 25,000, but the Des Plaines river, into which their sewers drain, is entirely too small a stream to care for the sewage produced.

George M. Wisner, chief engineer of the sanitary district, recently transmitted a report prepared by Langdon Pearse and his assistants, in which the conclusion is reached that the river is a nuisance from the Riverside dam to a point above Maywood and at times along the entire stretch. To relieve the nuisance four schemes were considered. The flow may be increased by storage or by pumping water from Lake Michigan into the upper portion, both too costly for consideration. Interceptors leading untreated sewage to the main drainage canal, or a complete treatment at one or two plants are the other suggested solutions. Treatment is considered essential in case the flow is limited to 10,000 section-feet. In order that the work may be prosecuted at the earliest opportunity detailed studies for both schemes will be carried to the point of making contract drawings.

Bids for armor plate for the three battleships to be built this year were opened by the Navy department recently. The companies bidding were the Carnegie Steel Co., the Midvale Steel Co., and Bethlehem Steel Co. and the Carbon Steel Co. Following were the bids on the four classes of armor plate: Carnegie Steel Co., A-1, $440; A-2, $504; B, $471; C, $548. Midvale Steel Co., A-1, $436; A-2, $486; B, $466; C, $376. Bethlehem Steel Co., A-1, $435; A-2, $499; B, $466; C, $395. Carbon Steel Co., C, $431.20.

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December, 1914

Pollution of Lake Waters

The International Joint Waterways Commission is now considering the pollution of boundary waters and is making a tour of lake cities to investigate the subject. The Commission some time ago, under the direction of Dr. Allan J. McLaughlin, made an exhaustive study of the waters of the lakes from the head of the lakes to the outlet into the St. Lawrence river and while the main body was found to be pure, considerable pollution existed off the shores of the leading cities and in the connecting rivers. Obviously the great sources of pollution are the cities. Every city, village and hamlet pours its sewage untreated into the waters of the lakes. This process goes on 24 hours of the day and 365 days in the year. Viewed dispassionately, it is a sad commentary upon our intelligence that we have allowed countless tons of untreated sewage to be poured into our drinking supply for generations. The time is, of course, coming when this dangerous practice will be stopped and it is hoped that the Commission will reach some definite conclusion on the subject.

Incidentally the Commission is investigating the pollution caused to the water supply by vessel traffic. Dr. McLaughlin's report indicated that there was some slight pollution existing at certain points that could not be traced to any other source than the vessels themselves, as, for instance, in Whitefish bay. This pollution is obviously infinitesimal in comparison to the great pollution caused by the municipalities. The statistics gathered by the Steamboat Inspection Service show that about 15,000,000 persons travel on the Great Lakes during the navigable season. Their life on the water, however, is of a very brief duration and probably would not average much over five or six hours per passenger, as one-half of this traffic is on the Detroit river, where the runs are brief. Granting that each passenger is on the water for six hours, the figures would work out into a permanent population of about 12,000 persons. The lakes have a stretch of 1,000 miles and it can well be seen how little such a vast body of water would suffer were the pollution confined to such a source alone. In fact, it would not exist at all, because sunlight and fresh air would rectify it. It would accomplish no purpose whatever to compel the vessels to sterilize their sewage in retaining tanks before discharging it overboard.

The representatives of the Lake Carriers' Association and the Dominion Marine Association discussed these points with the Commission during the present month and jointly assured the Commission that they would do all in their power to safeguard the public health, but they naturally felt that whatever they might do under conditions at present prevailing would be utterly lost.

Regarding drinking supplies aboard ship, the Commission was assured that the health of the crews is thoroughly safeguarded in that particular. Instructions have been issued to all masters to fill their drinking tanks in the middle of the lake, preferably Lakes Huron and Superior, where Dr. Laughlin's report proves that the waters still retain their pristine purity.

Lake Trade

Elsewhere in this issue is published an account of the opening of the new canal and third lock on the American side at Sault Ste. Marie. This new lock is 1,350 feet long, or 350 feet longer than the great locks of the Panama canal. Looking back, it is astonishing that the commerce of the lakes should in such a brief space of time require so enormous a chamber as this for its accommodation. Two steamers were locked down on the first down lockage carrying 23,000 tons of ore. Either of these two steamers could have easily carried in their capacious holds not only the total annual commerce of Lake Superior of sixty years ago, but all of the vessels carrying it with plenty of room to spare. The first canal at Sault Ste. Marie was completed in 1855 and 1,449 tons of ore were moved during that year. Prior to that time only a few small vessels were trading on that lake and all ore was portaged at the Sault and transferred to vessels plying to lower lake ports. There are men identified with lake trade who saw the beginning of it in a commercial sense and its development since have certainly been very wonderful. It is doubtful if elsewhere in the world there has been anything to equal it. The volume of business handled on the lakes annually during these latter years is equal to that handled in a decade in the earlier years. Naturally, such a wonderful increase coming so suddenly has brought its physical problems with it, but they have been magnificently handled and the equipment is such now that it can accommodate itself to very wide fluctuations. In fact, the physical equipment on the lakes has not been tested to its full capacity. It has the surprising quality of extending itself, and efforts that formerly appeared to be herculean are now accomplished with ridiculous ease.

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New Terminal on Lake Erie

At a meeting in the office of Harvey D. Goulder, Rockefeller building, Cleveland, on Tuesday morning, O. C. Barber, of Barberton, outlined the plan for the development of a great terminal on the lake shore at the foot of East Fifty-fifth street, Cleveland, to embrace docks with coal and ore handling facilities, as well as commercial docks for miscellaneous freight and connecting with a four-track, standard gage railway traversing the entire length of East Fifty-fifth street underground to Morgan Run, a distance of about 4½ miles. This railway could be further extended into the valley, making the total distance about 6½ miles. A considerable fill has already been made in the lake at East Fifty-fifth by city refuse. The distance from the shore line to the breakwater is 3,900 feet and Mr. Barber's idea is to have the riparian owners fill in for a distance of 1,900 feet, which would make an area of over 100 acres, available for docks and trackage. The sand for the fill could be obtained from the tunnel underneath East Fifty-fifth street. This railway, extending underneath East Fifty-fifth street, would connect with the trunk line and Belt Line railway and would open up a great undeveloped area. With switching facilities along the entire length of East Fifty-fifth street he felt that that whole thoroughfare could become a great manufacturing and wholesale district and that the railroads would command an enormous quantity of incoming and outgoing freight, as well as receive a considerable portion of lake-bound coal shipments.

Among those who attended the meeting were H. S. Pickands, of Pickands, Mather & Co.; J. H. Sheadle, of the Cleveland-Cliffs Iron Co.; T. F. Newman, of the Cleveland & Buffalo Transit Co.; D. C. McIntyre, of the Detroit & Cleveland Navigation Co.; M. W. Wardwell, of the Great Lakes Towing Co.; E. P. Lenihan, of Wilcox, Peck & Hughes; W. A. Hawgood, A. H. Hawgood, A. W. Thomson, of the Wilson Transit Co. and George A. Marr, secretary of the Lake Carriers' Association.

H. S. Pickands stated that he did not think that the terminal would attract the bulk freight trade materially as the railways have their own terminals pretty thoroughly established, while all ore destined to furnaces along the river would naturally make the entire trip by water. He felt, however, that there were enormous possibilities in the enterprise and that the establishment of such a terminal would develop a great many new industries.

Mr. Barber stated that he had so much faith in the project that he was willing to back it financially. It was suggested that the project be laid before the industrial committee and rivers and harbors committee of the Chamber of Commerce for further discussion.

Mayor Baker at a late meeting said that as mayor he heartily favored anything that made for the commercial development of the city and that he heartily approved the project of lake development. He thought, however, that the city might desire the insertion of a clause in the franchise along East Fifty-fifth street that would enable the city to recapture the street should the enterprise at any time become inimical to the real interests of the city. He stated, however, that the terms should be sufficiently generous so as not in any way to deter a legitimate enterprise. He thought, however, that the most essential thing to be determined first of all was the actual ownership of the lake front. It has latterly been contended that the state owns the submerged land extending from the shore line and that there is a case now pending in court to establish that right. It has progressed through the Common Pleas court which has held that the title of the submerged land rests in the owner of the riparian rights, that is to say, the one who actually holds title of the land abutting on the lake shore. An appeal has been taken and the mayor felt that this case should be brought to a definite conclusion before any real progress can be made in the enterprise. If the rght of ownership should be established in the state, he felt that the city would have no difficulty in having the state transfer the right to the city and that the city would have no other object than to further the utmost development of the lake front for commercial purposes. It was generally concluded that the first thing to do was to expedite this particular case through the various courts.

In a general discussion on the subject it was felt that the Baltimore & Ohio, the Erie and the Wheeling and Lake Erie railroads would take advantage of the new terminal.

October Lake Levels

The United States Lake Survey reports the stages of the Great Lakes for the month of October, 1914, as follows:

Lakes.	Feet above mean sea level.
Superior	602.75
Michigan-Huron	580.28
Erie	572.10
Ontario	245.59

Lake Superior is 0.05 foot lower than last month, 0.27 foot lower than a year ago, 0.03 foot above the average stage of October of the last ten years, 0.81 foot below the high stage of October, 1869, and 1.17 feet above the low stage of October, 1879. Average stages of the last ten years indicate that the November level will be 0.2 foot lower.

Lakes Michigan-Huron are 0.20 foot lower than last month, 0.44 foot lower than a year ago, 0.38 foot below the average stage of October of the last ten years, 2.66 feet below the high stage of October, 1876, and 0.68 foot above the low stage of October, 1911. Average stages of the last ten years indicate that the November level will be 0.3 foot lower.

Lake Erie is 0.27 foot lower than last month, 0.33 foot lower than a year ago, 0.08 foot below the average stage of October of the last ten years, 1.60 feet below the high stage of October, 1885, and 1.30 feet above the low stage of October, 1895. Average stages of the last ten years indicate that the November level will be 0.3 foot lower.

Lake Ontario is 0.50 foot lower than last month, 0.70 foot lower than a year ago, 0.41 foot below the average stage of October of the last ten years, 2.22 feet below the high stage of October, 1861, and 1.92 feet above the low stage of October, 1895. Average stages of the last ten years indicate that the November level will be 0.3 foot lower.

Grain Shortage

The vexing question of grain shortage which has irritated vessel owners for years is now in a fair way to be settled. For the first time the vessel owners have attacked the subject jointly through the Lake Carriers' Association, the Dominion Marine Association and the Association of Lake Lines. The practice of the grain shippers has been to hold the vessel liable for any shortage in the grain cargo on the assumption that the bill of lading was not otherwise a bankable document. Vessel owners have therefore made up the difference in cash out of their own pockets. Of course they got the benefit of over runs but it was no comfort to the vessel owner to know that someone else was profiting by his misfortune. The whole subject has been a sore spot with grain carriers for years but it was only until the past summer that the subject was attacked with spirit. Several shortages occurred which left the vessel owner absolutely nothing for his services after wages and provisions and other costs of operation had been met. In fact an actual deficit was not uncommon. It became imperative that something should be done to remedy a condition for which the vessel owner was in no way responsible.

Committees were appointed to find a solution as follows:

Lake Carriers' Association: William Livingstone, Harvey D. Goulder, W. H.

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McGean, Herbert K. Oakes, Jos. Rodgers and A. W. Thomson.

Dominion Marine Association: H. W. Cowan, George Fair, A. E. Matthews and Francis King.

Association of Lake Lines: J. C. Evans, E. T. Douglas, Charles M. Heald, Fred E. Signer and W. H. Smith.

A meeting was held in Detroit on Wednesday, Nov. 11, by A. W. Thomson, Fred E. Signer and Francis King, the chairmen of the respective committees of the three associations, and the following letter asking for a joint conference was sent to the secretaries of the interested grain exchanges:

"The Lake Carriers' Association, the Association of Lake Lines, and the Dominion Marine Association, representing practically all the grain-carrying tonnage on the lakes, are unanimously of the opinion that there is no reason why the vessel should assume responsibility for discrepancies in the weighing of grain cargoes, and that the Grain Bill of Lading, instead of throwing the responsibility upon the carrier, should contain a clause by the terms of which the vessel will have no claim for overages in the out-turns of cargoes, will accept freight on actual out-runs, and in case of shortages will assume responsibility for that shortage only up to a limited fractional part of a bushel per thousand.

"It has now been decided by duly authorized representatives of the three Associations named above to arrange a meeting for the purpose of discussing the matter with the shippers of the United States and Canada in order that a friendly understanding may be reached regarding the adoption of such a Bill of Lading, at which meeting the conditions upon which it would be reasonable for shippers to agree to the new clause might be discussed, and any incidental matter arising in connection therewith might be settled.

"This meeting will be held at the Hotel Ponchartrain, Dtaroit, on Tuesday, the 24th instant, at 9 A. M. Notice is being sent to all the leading Board of Trade and Grain Exchanges directly interested in the question, and your organization is invited to name representatives duly authorized to attend and discuss the matter and to take such action as may be deemed advisable. You will please communicate with Fred E. Signer, the Commissioner of The Association of Lake Lines, Buffalo, N. Y. Your early response will be very much appreciated."

The list to whom the letter was sent is as follows:

J. E. Hessong, secretary, Chamber of Commerce, Baltimore, Md.; F. E. Pond, secretary, Buffalo Corn Exchange, Buffalo, N. Y.; Jas. A. McKibben, secretary, Chamber of Commerce, Boston, Mass.; J. C. F. Merrill, secretary, Chicago Board of Trade, Chicago, Ill.; Munson Havens, secretary, Chamber of Commerce, Cleveland, Ohio; M. S. Donovan, secretary, Detroit Board of Trade, Detroit, Mich.; Chas. F. McDonald, secretary, Board of Trade, Duluth, Minn.; E. D. Bigelow, secretary, Board of Trade, Kansas City, Mo.; H. A. Plumb, secretary, Chamber of Commerce, Milwaukee, Wis.; John G. McHugh, secretary, Chamber of Commerce, Minneapolis, Minn.; George Hadrill, secretary, Board of Trade, Montreal, Que.; Secretary, Corn Exchange, Montreal, Que.; L. H. Howe, secretary, New York Produce Exchange, New York, N. Y.; F. P. Manchester, secretary, Grain Exchange, Omaha, Neb.; John I. Lofgren, secretary, Board of Trade, Peoria, Ill.; A. B. Clemmer, secretary, Commercial Exchange, Philadelphia, Pa.; Eugene Smith, secretary, Merchants Exchange, St. Louis, Mo.; A. Gassaway, secretary, Toledo Produce Exchange, Toledo, Ohio.; F. D. Morley, secretary, Toronto Board of Trade, Toronto, Ont., C. W. Bell, secretary, Grain Exchange, Winnipeg, Man.

A preliminary meeting of grain carriers will be held at the Hotel Ponchartrain, Detroit, on Nov. 23, and it is expected that every vessel owner interested in grain carrying will be represented.

The grain carriers are quite stirred up and are determined that the issue shall be settled upon an equitable basis.

Commerce of Lake Superior

During October 7,740,005 net tons of freight were moved through the canals at Sault Ste. Marie as against 8,417,716 tons for September, a decrease of 677,711 tons. Movement to Nov. 1 was 38,840,433 tons as against 51,732,783 tons up to Nov. 1, 1913, a decrease of 12,892,350 tons. Following is the summary:

	To Nov. 1, 1913.	To Nov. 1, 1914.
EAST BOUND.		
Copper, net tons	77,492	60,584
Grain oth. than wheat, bushels	78,236,823	49,476,500
Bldg. stone, net tons	6,181	.....
Flour, barrels	8,255,362	8,130,462
Iron ore, net tons	44,678,144	30,294,290
Pig iron, net tons	20,399	15,713
Lumber, M. ft. B. M.	524,030	408,178
Wheat, bushels	137,530,449	109,323,913
Unclass. frgt, net tons.	361,722	223,291
Passengers, number	37,047	28,439
WEST BOUND.		
Coal, anthracite, net tons	2,403,624	1,827,211
Coal, bituminous, net tons	14,308,378	11,323,334
Flour, barrels	2,303	662
Grain, bushels	400	.....
Mfctd. iron, net tons	320,571	196,223
Iron ore, net tons	32,376	3,696
Salt, barrels	603,685	651,256
Unclass. frght., net tons	1,055,879	927,350
Passengers, number	39,302	30,862
SUMMARY OF TOTAL MOVEMENT		
East bound, net tons	52,681,355	36,398,565
West bound, net tons	18,311,213	14,375,115
Total	70,992,568	50,773,680
Vessel passages	20,864	17,065
Net registered tonnage.	51,732,783	38,840,433

Iron Ore Shipments

Iron ore shipments during October were somewhat more than was expected. The fleet moved 4,242,392 gross tons as against 6,526,103 gross tons for October, 1913, a decrease of 2,283,711 tons. The movement to Nov. 1 was 30,951,805 tons as against 45,799,520 tons for the corresponding period last year, a decrease of 14,847,715 tons. It is not expected that the November movement of iron ore will bring the total much beyond the 32,000,000-ton mark as the greater part of the ore-carrying fleet is already in winter quarters. Following is the movement by ports during October and up to Nov. 1 with corresponding data for the preceding year:

Port.	October, 1913.	October, 1914.
Escanaba	617,119	421,341
Marquette	369,293	265,861
Ashland	497,952	487,829
Superior	2,040,651	1,442,216
Duluth	1,689,427	918,144
Two Harbors	1,311,661	707,001
	6,526,103	4,242,392
1914 decrease		2,283,711

Port.	To Nov. 1, 1913.	To Nov. 1, 1914.
Escanaba	4,914,342	3,440,992
Marquette	2,942,897	1,651,579
Ashland	4,056,754	3,229,746
Superior	12,858,975	10,920,469
Duluth	11,520,153	6,197,043
Two Harbors	9,506,399	5,511,976
	45,799,520	30,951,805
1914 decrease		14,847,715

Lake Erie Ore Receipts

Out of total shipments of 4,242,392, gross tons of iron ore during October. 3,526,795 tons went to Lake Erie ports, distributed as follows:

Port.	Oct., 1914.
Buffalo	397,679
Erie	10,758
Conneaut	966,995
Ashtabula	628,161
Fairport	216,613
Cleveland	750,858
Lorain	283,602
Huron	64,898
Sandusky	.....
Toledo	158,382
Detroit	48,849
Total	3,526,795

The Iron Steamboat Co. of New Jersey at a recent meeting elected the following directors for the ensuing year: W. G. Besler, F. A. Bishop, J. M. Ceballos, Frederick H. Cone, C. M. English, T. Ellett Hodgskin and F. W. Luckemeyer. The stockholders reduced the number of directors from nine to seven.

A reversal of the verdict of the local steamboat inspectors at Baltimore was given Capt. E. E. Johnson by Supervising Inspector Col. John W. Oast of the fifth district. Col. Cast has exonerated Capt. Johnson of all blame for the sinking of the Old Dominion liner Monroe, which vessel he commanded when she was sunk last winter by the Merchants' and Miners' liner Nantucket.

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Steamer Edward Peirce

The sailing of the steamer Edward Peirce from the yard of her builders the Newport News Shipbuilding & Dry Dock Co. adds another "made in America" unit to the not overcrowded merchant marine of the United States. This is the third steamer for the Crowell & Thurlow Steamship Co. of Boston, Mass., built at Newport News, as the Peter H. Crowell and Lewis K. Thurlow are the products of the same yard.

The Edward Peirce while designed primarily for a collier is fitted with cargo handling gear, cargo battens, etc., so that her usefulness is not confined to carrying coal. The vessel will make a successful carrier for any kind of bulk cargo, lumber or general cargo.

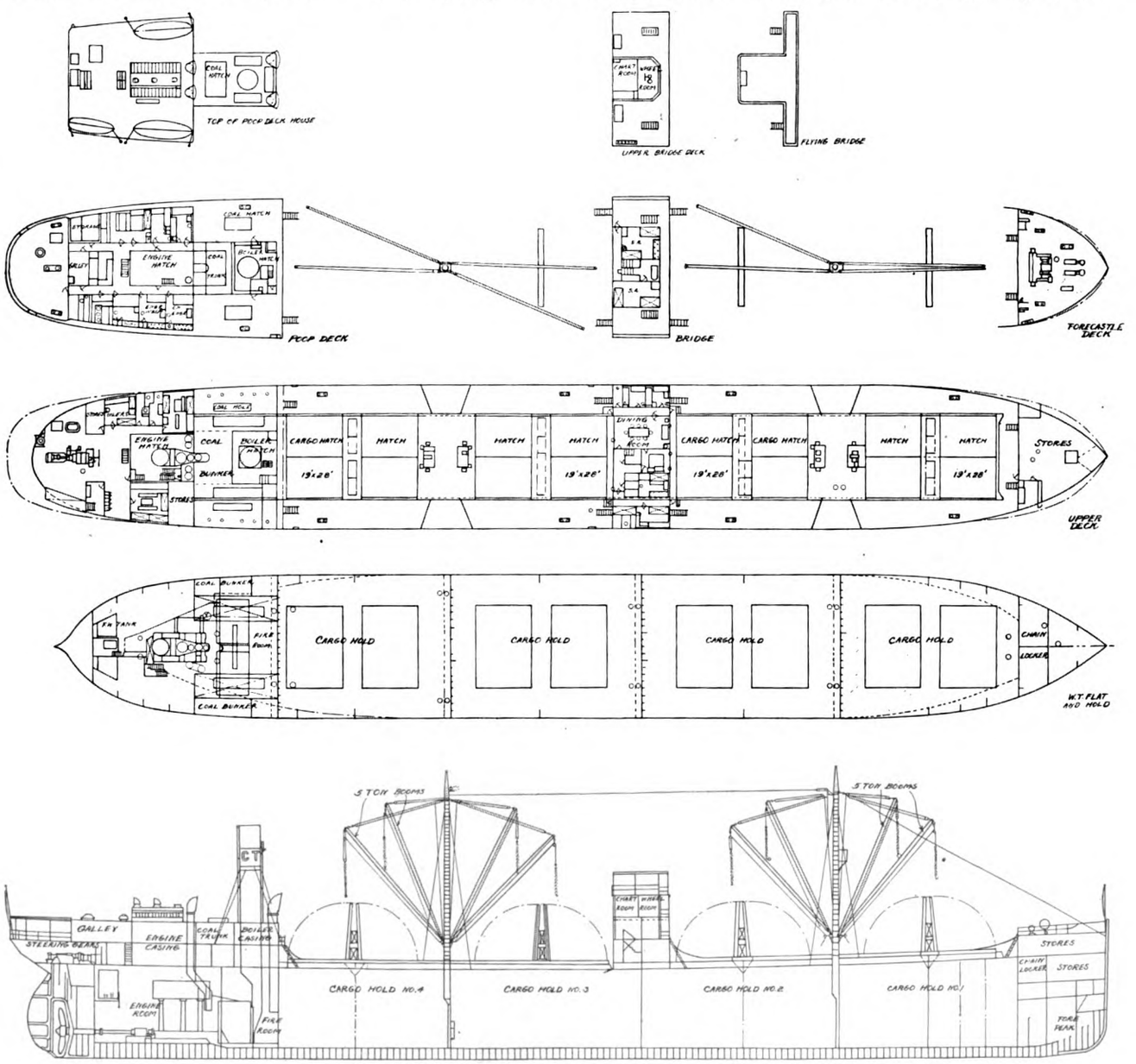
The dimensions are as follows:

Length over all.....	375 feet
Length Lloyds'	360 feet
Beam moulded	49 feet
Depth moulded	30 feet
D. W. at 23 feet draft..	6500 tons
Sea speed loaded.....	10 knots
Gross tonnage	4387
Net tonnage	3228

The vessel is single screw with two masts and machinery aft. Accommodations for deck officers are in a short bridge amidship. The crew and engineers are accommodated under poop deck and in a deck house on the poop deck. The galley, refrigerating rooms and refrigerating machinery, are aft, and there is a direct connected steam steering gear, with telemotor control from pilot house. A continuous trunk for extent of hatch openings permits the decks to be raised between hatches simplifying drainage and gaining in cubic capacity. There are eight hatches 19 x 26 feet fitted with steel hatch covers and rubber gaskets.

The propelling machinery consists of a triple expansion engine 23 x 39 x 66 inches diameter of cylinder by 45-inch stroke, a main and auxiliary condenser, air pump of Edwards type, centrifugal circulating pump, two attached feed pumps, two attached bilge pumps, fire and donkey pump, ballast pump, one 20-ton evaporator Reilley feed water heater and Ebson filter. The boilers are of the single ended scotch type; 15 feet diameter, 11 feet 6 inches long with three 45-inch Morrison furnaces and separate combustion chambers. They are designed for heated forced draft, and a working pressure of 180 pounds of steam.

The keel of this vessel was laid June 17, and the vessel was launched Oct. 24, with engines aboard, stack up, boilers



SECTIONAL PLANS OF THE STEAMER EDWARD PEIRCE

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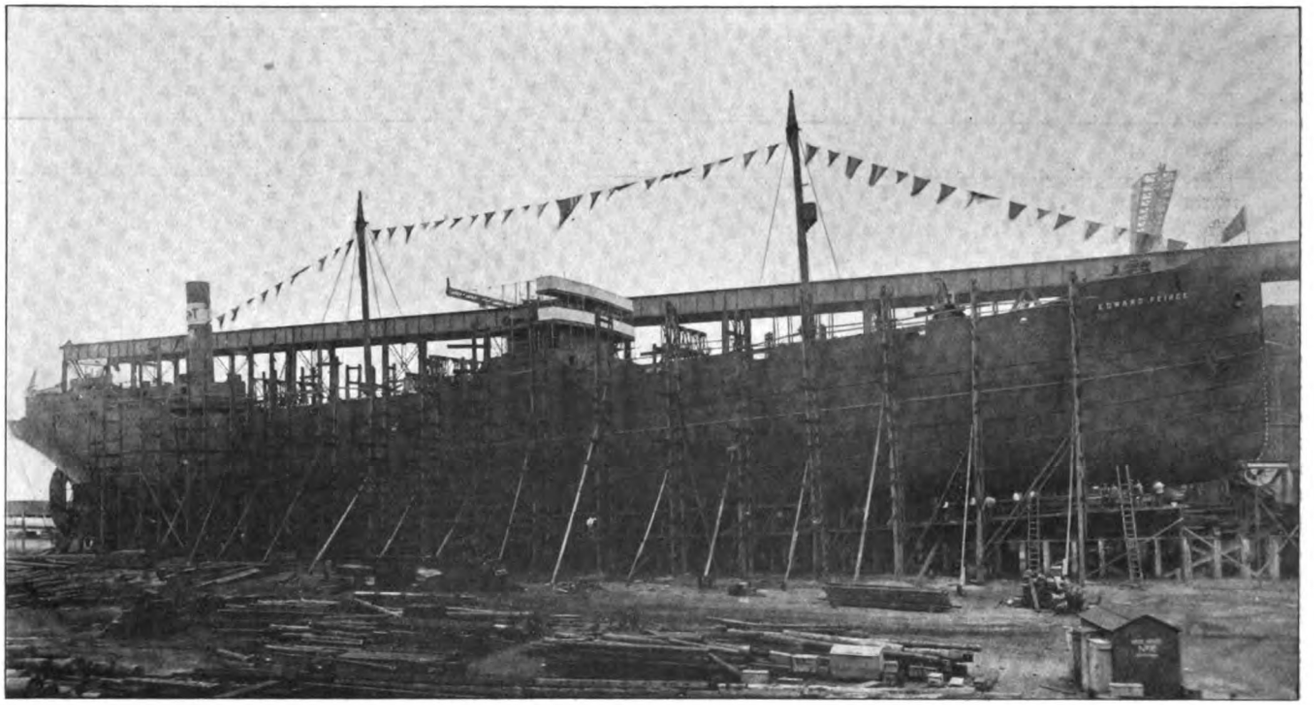

THE STEAMER EDWARD PEIRCE ON THE STOCKS AT NEWPORT NEWS

tested and ready for steam. Dock trial was on Nov. 2, and delivery to owners on Nov. 6, 1914. The accompanying plans illustrate the vessel.

Shipping Returns of the United Kingdom

Recently the Board of Trade published their usual annual statement giving the shipping returns of the United Kingdom. The figures show that last year there was a considerable increase in the number and tonnage of vessels engaged in our foreign trade, which, however, is more apparent than real, as the authorities have adopted a different system of compiling the figures. To what extent the "increase" is due to this alteration of method it is, apparently, impossible to say. The figures show that 39,692 British vessels, of 46,602,920 tons, entered the United Kingdom ports with cargoes and in ballast, an increase of 1,592 vessels and 2,311,078 tons as compared with the previous year, while 38,928 foreign vessels of 35,545,649 tons entered with cargoes, an increase of 2,971 vessels and 3,646,875 tons. In the clearances with cargoes and in ballast British tonnage showed an increase of 2,271,707 tons, and foreign tonnage of no less than 4,122,876 tons. As might be expected, Germany is the principal competitor with a total of 9,073,855 tons entering the United Kingdom ports, Norway coming next with 5,883,316 tons, and Sweden third with 3,400,660 tons. In our trade with foreign countries the tonnage entering from Germany was the highest, reaching 11,065,987 tons, France coming next with 10,918,454 tons, and the United States third with 9,359,670 tons. It will be seen, therefore, that of the tonnage arriving in this country from abroad 12 per cent comes from Germany, while of the vessels entering United Kingdom ports no less than 11 per cent are owned by Germans; and whereas the British tonnage engaged last year increased by 5 per cent, German tonnage showed an increase of no less than 17 per cent.

The figures dealing with the arrivals and departures at the principal ports of the United Kingdom show that London still maintains its position at the head of the list, Liverpool being a good second, while Glasgow is now seventh on the list as compared with the ninth position in 1912, as will be seen by the following figures:

	1912. Tons net.	1913. Tons net.
London	24,049,797	25,129,064
Liverpool	22,604,006	23,263,471
Cardiff	16,067,313	18,064,601
Newcastle	14,557,733	15,715,580
Southampton	11,376,904	13,326,252
Hull	8,220,857	9,055,565
Glasgow	7,109,174	7,904,948
Plymouth	7,516,065	7,587,768
Cork	7,292,687	7,454,198
Grimsby	3,635,406	5,254,215
Newport	4,338,436	4,903,784
Swansea	4,413,572	4,901,965

On Dec. 31 last 8,336 sailing ships of 846,504 tons net and 921,861 tons gross, and 12,602 steamers of 11,273,387 tons net and 18,683,039 tons gross, were owned in the United Kingdom, showing an increase of 215,000 tons net on the year. Of the steamers owned over 53 per cent were under ten years of age. In vessels over 500 tons steamers of between 2,000 and 3,000 tons net are most in favor, there being 1,599 of 4,000,870 tons of this size, while there 1,134 steamers of 1,751,329 tons between 1,000 and 2,000 tons net, 555 steamers of 1,863,643 tons between 3,000 and 4,000 tons, and 336 steamers of 1,589,068 tons between 4,000 and 6,000 tons. As regards the gross tonnage the favorite size is between 3,500 and 4,000 tons, 651 steamers of 2,438,943 tons gross being of this size; then comes the range between 4,000 and 4,500 tons, and next between 3,000 and 3,500 tons.

Last year 292,057 persons were employed on vessels registered in this country, of which 32,639 were foreigners, equal to 11.17 per cent of the number employed, as compared with 10.80 per cent in 1912. In addition, it would seem that 96,472 men and boys are engaged in fishing boats, and as these are practically all Britishers the percentage of foreigners would thus appear to be 8.40 per cent of the number employed.

Tables are also given showing the tonnage engaged in the trade between the United Kingdom and abroad, but the tables cannot be relied upon as an index to the trade between the various countries owing to the fact that the Board of Trade only take cognizance of the final port to which the vessel is bound. For instance, a foreign vessel bound to, say, Japan with a full cargo to be discharged at Singapore, would appear as bound to Japan, the destination of the ship being given and not that of the cargo. It is thus impossible to say what amount of foreign tonnage is engaged in our impe-

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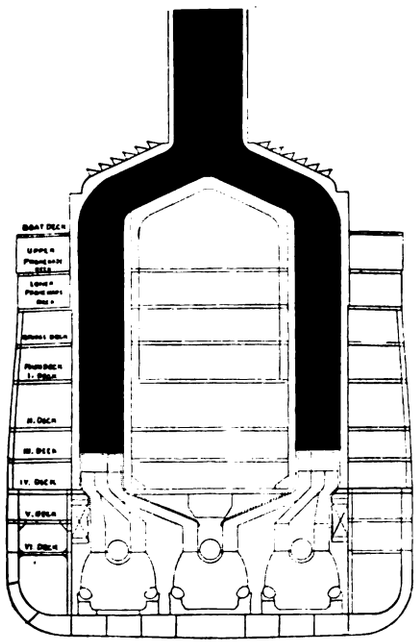
rial coasting trade. The figures, however, are instructive as showing the extent of foreign tonnage calling at ports in the United Kingdom. In the trade with Germany 2,478,861 tons entered this country with cargoes, and 5,757,151 tons cleared for Germany with cargoes, of which the German flag was responsible for 820,888 tons and 2,275,226 tons respectively. Of the vessels entering from the Netherlands with cargo, 1,398,153 tons out of a total of 3,140,511 tons were under the German flag, and 1,518,604 tons out of a total of 3,492,305 tons cleared with cargoes were German owned. German steamers also constituted by far the largest tonnage amongst foreign ships engaged in the trade between this country and Pacific ports, German West Africa, Belgium, Canary Islands, Egypt, America, China, United States, Mexico, Chile and Argentine.

The Vaterland

The Vaterland is driven by quadruple turbine engines, making normally 185 revolutions per minute. The propelling machinery is accommodated in three engine-rooms, the foremost one of which is 69 feet long and the two others 95 feet long. The total forward normal effort amounts to 72,000 horsepower, which gives an average speed of 23½ knots. The backward effort of all astern turbines amounts to 35,000 horsepower. The steam at "going ahead" passes first to a high-pressure turbine on one of the inner shafts, then an intermediate-pressure turbine on the other inner shaft, and then passes equally divided on to two low-pressure turbines on the outer shafts. Each separate shaft is available, however, by itself for running or maneuvring. The astern turbines are subdivided into two equal high-pressure and low-pressure turbines, the low pressure being arranged on the outer shafts. The total turbine installation has 760,000 bronze blades. The thrust bearings, which have to take up the thrust of the propellers, have a surface of about 75 square feet altogether. The exhaust steam is condensed in four condensers of pear-shaped section, each having a cooling surface of 16,150 square feet. Four centrifugal pumps of 4 feet 3 inches diameter, driven by two engines, supply the cooling water for the condensers. Four double-feed pumps draw the feed water from the tanks in the double bottom, and, in conjunction with four main feed pumps, deliver it into the boilers. It is interesting to note that on her trials extending over two days, at the end of April, from the mouth of the Elbe to the coast of Norway and back, she averaged a speed of 25.8 knots. Against a 60-mile-an-hour gale, she averaged 25.4 knots, with wind behind reached 26.3 knots. The vessel behaved magnificently under all conditions experienced on her trials. The engines developed 90,000 horsepower, worked without hitch and entire absence of vibration.

Boilers.—There are 46 single water-tube boilers arranged in four rooms, each 75 feet long and extending with their bunkers over the whole width of the ship. The necessary steam is generated at a pressure of 235 pounds on the inch. The total heating surface is 203,000 square feet., and the total grate area 3,760 square feet. The air required for the forced draught is



Amidships Cross-Section of the Vaterland, Showing How the Funnels Divide to Avoid Passing Through the Center of the decks

drawn by four fan blowers. Each of these blowers has a fan of 13 feet 9½ inches diameter, and forces the air through channels of 45 square feet cross-section into the space under the grating of the furnaces. Four ash-ejector pumps with 6,356 cubic feet capacity per hour, 16 ash ejectors, six ash hoists and three ash-cooling valves are provided for removing the ashes from the furnaces overboard. Four steam bilge pumps, each of 4,944 cubic feet capacity per hour, continuously empty the bilges of the engine and boiler rooms. Four feed-water purifiers, two oil separators, as well as two mixing feed-water heaters and two economizers for heating the feed-water, are provided.

Engine-Room Staff.—In the engine-room there are the chief engineer, three first engineers and 25 engineer officers, besides a small army of greasers, stokers, trimmers, etc., numbering about 350.

Electricity. — An efficient electric lighting system contributes to the comfort and safety of the vessel. Current is generated by five turbine dynamos of 2,000 amperes and 110 volts, which serve to give power to 10,000 electric lamps on the ship. A sixth dynamo of 100 amperes is placed far above the water line, insuring light even if the machines in the lower engine-room are disabled. A completely fitted machine shop is situated in the forward engine room, containing all the latest and most powerful machines, including lathes and drills, planers, etc.

Panama Canal Tolls to Nov. 1

Tolls collected on tonnage through the canal from August 15, the date of its opening, to Nov. 1, amounted to $735,182.32. To this should be added tolls on freight transported through the canal prior to August 15, on barges operated by the Panama railroad, which amounted to $11,610.69, making the grand total of tolls collected to Nov. 1, $746,793.01. The collections in detail were as follows:

	Amount
Prior to August 15	$ 11,610.69
August 15 to August 31	88 232.60
September	269,863 00
October	377,086.72
Total	$746,793.01

The collections in October show an increase over the previous month of $107,223.72, or about 40 per cent.

The number of vessels that passed through the canal northward during October was 40; number southbound, 45, including three launches.

Capt. George E. Burd has been appointed industrial manager of the New York yard. Rear Admiral Usher will remain commandant of the yard with supreme authority but will be relieved of the harrassing details of the management of its 5,000 workmen. He will devote himself to purely naval questions. Capt. Burd, an engineering officer, has for some time been in charge of the machine shop in the New York yard. If the experiment proves successful construction officers will be appointed for the other yards.

The Racine-Truscott-Shell Lake Boat Co. are building a tug for the government engineer at Duluth to be christened the General Sears and to be 110 feet long and 26 feet beam, of steel construction throughout. Delivery is promised by June, 1915.

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Ships Interned at Antwerp

Following is the list of German ships interned at Antwerp and which were disabled by the Belgians prior to the evacuation of the city. It will be seen that the Hansa Line was the chief sufferer with a loss of four ships of 20,955 tons:

Name of steamer.	Gross tons.	Built in	Name of Owners.
Almaria	4,606	1903	Hamburg-American Line.
Andree Rickmers	4,173	1907	Rickmers Co.
Atto	5,169	1911	Roland Linie A. G.
Bellona	1,041	1900	Dampf. Ges. Neptun.
Christine Sell	777	1904	Jonas Sell.
Croatia	1,991	1888	Damp. Rhed. Merkur G. m. b. H.
Delia	1,224	1907	Dampf. Ges. Neptun.
Delos	2,214	1889	Deutsche Levante Linie.
Elbing	4.884	1898	Deutsch-Austral. D. G.
Elisabeth Rickmers	4,174	1906	Rickmers Co.
Erika	2,666	1906	Ozean Dampfer. A. G.
Feronia	691	1899	Dampf. Ges. Neptun.
Ganelon	5,586	1907	Roland Linie A. G.
Gneisenau	8,185	1903	North German Lloyd.
Hanau	4,213	1907	German-Australian Line.
Hermes	1,180	1899	Dampf. Ges. Neptun.
Hispania	2,266	1895	W. Kunstmann.
Huberfels	5,814	1913	Hansa Line.
Jade	536	1912	Verein. Bugs. and Fracht. Ges.
Kalliope	1,434	1914	Dampf. Ges. Neptun.
Kandelfels	5,739	1912	Hansa Line.
Lesbos	1,928	1890	Deutsche Levante Linie.
Lipsos	3,979	1902	Deutsche Levante Linie.
Portimao	1,489	1899	Oldenburg-Portugiesische Co.
Santa Fe	5,342	1901	Hamburg-Sued Amerik. D. G.
Schildturm	5,107	1911	Hansa Line.
Sines	1,294	1894	Oldenberg-Portugiesische Co.
Sirius	742	1889	Dampf. Ges. Neptun.
Tasmania	7,514	1913	Deutsch-Austral. D. G.
Theseus	984	1900	Dampf. Ges. Neptun.
Totmes	7,130	1914	Kosmos Co.
Ursula	913	1892	Renata Dmpfsch. Ges. Th. Gribel.
Wartburg	4,295	1905	Hansa Line.

American Blower Service

The American Blower Co. has received a letter from E. H. Parry, chief engineer of the steamer James Corrigan, which is very good testimony for the reliability of the company's blower engines. These engines, in fact, frequently run an entire season without adjustment and with only one replenishment of the oil supply. Following is a copy of the letter:

"Will you kindly ship me a finished casting marked *A648* for blower engine No. *4400* Type A, size 7x7 to Str. James Corrigan. We have three of your engines in use on the Corrigan that have been in constant use through the season of navigation since the spring of 1908 and this will be the first expenditure for repairs in that time. Two of the engines are connected to dynamos and one to the fan that furnishes air for draft system to boilers. If you will ship this casting by parcel post it will be delivered to us as we pass Detroit by the U. S. mail boat."

P. S.—This casting was broken by falling and not through wear.

Locating Sound

Editor MARINE REVIEW:—An article on page 289 of your August number has just been called to our attention, a reprint from Fairplay, headed "Localizing Sound", in which is emphasized the inability of one vessel to locate another by means of her wireless or submarine signals. To quote one sentence:

"Submarine signaling suffers from the same defect in that it cannot help one vessel to locate another."

Up to a short time ago the submarine signal apparatus on a steamer was simply a receiving apparatus, she having no means of sending out sound under water. Her apparatus was used primarily for the detection and obtaining the direction of bells which were rung under water as coast warning signals from lightships, bell buoys and as we term them electric shore stations, that is, bells placed on tripods on the bottom of the ocean and connected with the shore by a cable through which an electric current was sent out which operated the bell. However, with the receiving apparatus which was on the steamships it was often possible to get the direction of another steamer by the noise that the other steamer created in the water due probably to some part of the propelling machinery.

At the present time, however, there has been put on the market an apparatus which we call an oscillator. We are sending you a copy of a lecture delivered by Prof. Fessenden, the inventor of the apparatus, before the American Academy of Arts and Sciences, on this oscillator. From this you will see that by means of it two vessels on the surface can communicate with each other and also each vessel can obtain accurately the direction that the other vessel is from her.

In the three important collision accidents, the Storstadt and Empress of Ireland, the Nantucket and Monroe and the New York and Pretoria, had both of these vessels been equipped with this oscillator there would be absolutely no excuse for these collisions having occurred as each vessel would have kept herself informed of the exact direction the other vessel was from her.

Submarine Signal Co.

Boston, Oct. 21.

The Fessenden oscillator was described in the September, 1914, MARINE REVIEW, page 351.

Great Northern Launched

The new steamship Great Northern, building for the Great Northern Steamship Co., was launched at Cramp's, Philadelphia, recently, being christened by Mrs. Edith Kane Baker, wife of George H. Baker Jr., first vice president of the First National Bank of New York. The Great Northern and her sistership, the Northern Pacific, are 525 feet over all, 63 feet molded beam and 50½ feet deep. They are to run on the Pacific coast between San Francisco and Astoria, Ore., and will have a sea speed of 23 knots. Their appointments will be of the finest order. The passenger quarters are designed to accommodate 478 first-class passengers, 100 second-class passengers and 240 third-class passengers. They are intended to compete with the Southern Pacific Railway between Astoria and San Francisco, and their schedule is said to approximate that of the overland route. These vessels are fitted with Dreadnought interior flooring, manufactured by the Dreadnought Flooring Co., 30 E. Forty-second street, New York.

McNab Specialties

The McNab Co., Bridgeport, Conn., has received contract to supply their electrical whistle control for the steamers Great Northern and Northern Pacific, building at the yard of Wm. Cramp & Sons Ship & Engine Building Co., Philadelphia. This company also recently supplied the Pacific Mail Steamship Co.'s fleet with ten McNab direction indicators, the entire fleet now being equipped with these instruments. Seven of these direction indicators have also been placed with the Southern Pacific Co., New York. The new steamer J. A. Moffett, now building at the Union Iron Works, San Francisco, will be equipped with three McNab direction and revolution indicators, a McNab pneumatic counter and an electrical steamship whistle control. The McNab company has also installed 32 furnaces with their Cascade boiler circulator and fuel economizer on vessels of the American-Hawaiian Line, as well as an automatic electrical whistle control on the steamer Columbian, belonging to this fleet.

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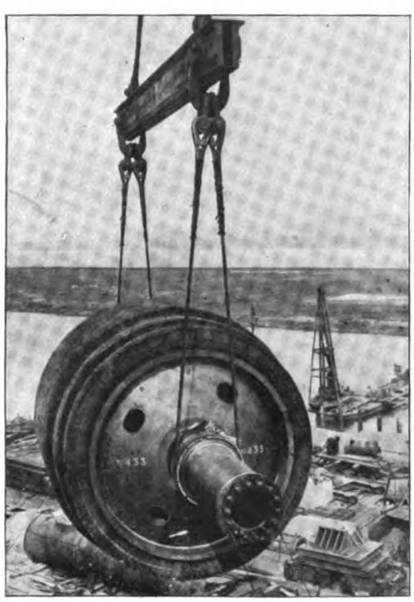
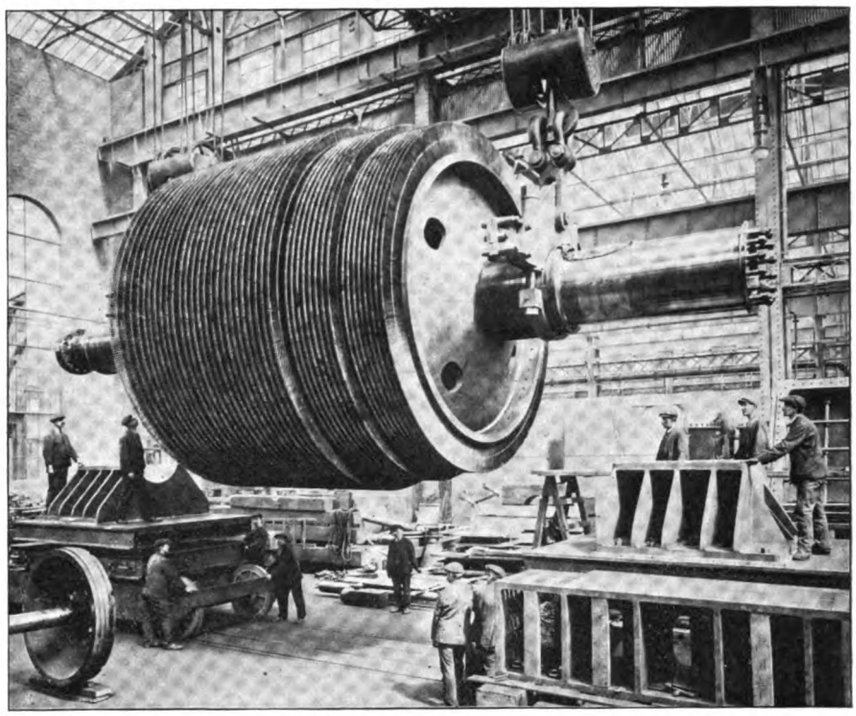
Britannic's Low Pressure Turbine

Despite the war active construction work continues on the 50,000-ton steamer Britannic, the largest vessel flying the British flag, which the White Star Line expects to place in service in 1915. The accompanying views show the low-pressure turbine rotor, which has just been installed in the steamship. This rotor is of the usual Parsons type, taking steam from the two reciprocating engines at about 9 pounds absolute pressure and exhausting at 1 pound absolute, and when running at 165 revolutions per minute will develop more than 16,000 horsepower.

The rotor is among the largest and most powerful ever constructed for marine service, and apart from its casing, which weighs 152 tons, is 49 feet long and 16 feet 11 inches in diameter. The complete turbine installment weighs 420 tons. The blading is of the regular Parsons laced type, with distance pieces at the roots and binding soldered on the edge. The blades range in length from 18 inches to 25½ inches, and, to be exact, number 58,946, which if placed end to end would extend 12½ miles. The utmost care and precision, as in making a fine watch, have been expended in the building of this splendid piece of machinery. When the Britannic is being maneuvered, as in harbors, etc., the turbine is out of action, only the reciprocating engines being used.



TURBINE ROTOR OF BRITANNIC



TURBINE ROTOR OF BRITANNIC IN SHOP

Kingsley Montgomery, Chester, Pa., bought at auction recently the Roach ship yard at Chester for his clients at $5,000. Mr. Montgomery represented the bond holders. The mortgage on the property amounted to $100,000.

Items of Interest

The Union Iron Works, San Francisco, Cal., has under construction two steel oil tankers, one for the Union Oil Co. and the other for the Standard Oil Co.

Andrew Fletcher, president of the W. & A. Fletcher Co., Hoboken, N. J., has been elected a director of the American Locomotive Works to succeed Charles M. Schwab.

The draftsmen of the Bath Iron Works held their annual outing and clambake on Oct. 10. The committee in charge consisted of W. A. Murtagh, R. P. Schlenker, R. R. Johnson and R. C. Cowles.

William G. Abbott & Son, South Milford, Del., have under construction two wooden steamers for service in New York harbor. One of the vessels will be a 400-ton freighter, while the other will be 112 feet long.

The Polson Iron Works, Toronto, Ont., launched on November 7 the steamer Grenville for the Department of Marine and Fisheries, Ottawa, Canada. The Grenville is 154 feet 6 inches long, 30 feet beam and 13 feet deep.

The M. J. Dady Engineering & Contracting Co. has leased the property of the Southern Ship Building Co. of Staten Island and is preparing to build a modern shipbuilding plant at that point. The present plant covers an area of 15 acres.

The E. W. Bliss Co., Brooklyn, N. Y., has given contract for a new steam gunboat of the oil-burning type, to be 125 feet long. The new craft will be fitted with air compressors, machine shop and quarters for a crew of thirty, and will be built during the winter at Sag Harbor, L. I., N. Y.

Capt. John Barry, who was for several years superintendent of the McQuade Stevedoring Co. of New York, has taken charge of a steamer in the oil carrying trade between Tampico, Galveston and the Crescent City. Capt. Barry was formerly in the employ of W. R. Grace & Co.

Work is progressing rapidly on the new self-propelling dredge building at the yard of the Skinner Ship Building & Dry Dock Co., Baltimore, for the U. S. Engineers' Department at San Francisco. The new dredge will be 160 feet long, 30 feet beam and 17 feet deep and will cost $201,990, delivered at Baltimore.

The following officers were elected at the annual meeting of the New Orleans Steamship Association recently: President, S. T. DeMilt; vice president, A. R. LaFonta; treasurer, Frank A. Daniels; secretary, David B. Penn; assistant secretary and manager of cotton inspection bureau, Fred Roehl; counsel, George H. Terriberry.

The Southern Steamship Co., Galveston, Tex., was organized recently, being a merger of the Texas City Steamship Co. and the Southern Steamship Co. The combined fleet comprises eight steamers and the general offices of the company will be located at Galveston. J. H. W. Steele is president of the new company and George W. DeLonan, vice president and traffic manager.

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Jupiter's Electric Machinery

The Navy department has received the report of Lieut.-Com'dr C. S. Kempff, who brought the new collier Jupiter from the Pacific coast recently through the Panama canal, during which her turbo-electric propulsive machinery, furnished by the General Electric Co., was given a thorough test. Lieut.-Com'dr Kempff states that the Jupiter with an inadequate rudder successfully navigated the many tight places, as around the Culebra cut where only 40 feet clearance in all directions is available, in a most satisfactory manner. While coming up the coast and steaming at the rate of 14½ knots, the Jupiter, upon sighting an object ahead, in five seconds' time had her motors reversed to full speed astern and was changed to full speed ahead in the same period of time. This ease of control in the turbo-electric drive appeals to naval commanders, as it is believed that great efficiency in maneuvering could be gained for battleships equipped with this type of propelling machinery, and the department is consequently considering its installation in one of the new dreadnoughts.

Other valuable advantages of the Jupiter's propulsive machinery brought out by her recent trip are that under favorable conditions she made 12 knots with 20,000 tons displacement on sixty tons of coal a day, a saving of 25 per cent over reciprocating engines. The Jupiter is designed for 14 knots, but maintained 15 knots for a period of forty-eight hours. Her machinery has also made such a good record in repair costs in two years of successful operation that it is considered by the Department to have passed the experimental stage.

Miscellaneous

R. M. Henningsen has been appointed harbor engineer of Oakland, Cal.

The Cowles Ship Yard, Buffalo, has been awarded contract for a steel tug for the Tonawanda & Grand Island Ferry Co., Tonawanda, N. Y.

Judge Putnam of Portland, Me., has appointed Calvin Austin receiver for the Eastern Steamship Corporation on a petition recently filed by the Berwind-White Coal Mining Co. of Philadelphia. The receivership is considered to be part of a plan for reorganizing the Corporation.

An inspection of the Newport News Shipbuilding & Dry Dock Co. and of the property of the Chesapeake & Ohio Railway Co.'s property was made recently by H. E. Huntington with the board of directors and other officials of the railway. Homer L. Ferguson, vice president and manager of the shipyard, who is thoroughly familiar with every detail of this extensive plant, conducted the tour.

The Lidgerwood Manufacturing Co., 96 Liberty street, New York, has during the 40 odd years of its existence built more than 37,000 electric and steam hoists and a comparison of the type built 30 years ago and that of today is interesting from an engineering standpoint.

Contracts for the three new battleships California, Mississippi and Idaho, have been awarded by the Navy department as follows: New York Shipbuilding Co., Camden, N. J., $7,250,000; Newport News Shipbuilding & Dry Dock Co., Newport News, Va, $7,115,000; Brooklyn navy yard.

The Kinzie Bros. Steamboat Line, Fort Myers, Fla., has given contract to William R. Osborn & Sons, Croton, N. Y., for a shallow draft freight and passenger steamer, to be named Dixie. The new vessel will be 100 feet long, 20 feet beam and 4 feet 2 inches deep. She was designed by Cox & Stevens, naval architects, New York.

In view of the probable increase of trade between the United States and Central and South American ports as a result of the European war, the steamers Yoro and Ceiba of the Vaccaro Bros. Line, New Orleans, are being lengthened 40 feet each, at the yard of the Newport News Ship Building & Dry Dock Co.

The Fore River Shipbuilding Corporation, Quincy, Mass., recently received an order for 20 submarines, amounting to about $10,000,000. The names of the contractors for these vessels have not been announced, but it is understood that the vessels are not to be delivered in a completed state but in finished sections ready for assembling. The engines are to be built at the Groton, Conn., plant of the Electric Boat Co., and the type of submarine to be constructed will probably be that for which this company holds patent rights.

SUMMARY OF NAVAL CONSTRUCTION.

Name of Vessel.	Contractor.	Per cent of completion Nov. 1, 1914. Total.	Per cent on ship.	Oct. 1, 1914. Total.	Per cent on ship.
BATTLESHIPS					
Nevada	Fore River Ship Building Co.	77.8	72.3	75.8	69.7
Oklahoma	New York Ship Building Co.	79.3	78.3	76.3	74.0
Pennsylvania	Newport News Ship Building Co.	58.3	47.8	51.6	42.7
Arizona	New York Navy Yard.	36.8	31.6	33.6	27.0
California	New York Navy Yard.	....	....	....	....
Mississippi	Newport News Ship Building Co.	....	....	....	....
Idaho	New York Ship Building Co.	....	....	....	....
DESTROYERS					
Downes	New York Ship Building Co.	95.3	95.3	95.3	95.3
O'Brien	Wm. Cramp & Sons.	88.4	87.1	85.2	83.5
Nicholson	Wm. Cramp & Sons.	86.5	85.1	84.2	82.6
Winslow	Wm. Cramp & Sons.	82.3	79.1	79.3	75.9
Cushing	Fore River Ship Building Co.	73.7	70.7	68.1	64.7
Ericsson	New York Ship Building Co.	87.4	87.3	85.3	85.2
Tucker	Fore River Ship Building Co.	18.8	11.6	16.0	9.1
Conyngham	Wm. Cramp & Sons.	39.5	36.3	28.7	24.6
Porter	Wm. Cramp & Sons.	29.5	24.9	15.0	8.0
Wadsworth	Bath Iron Works.	66.4	63.4	62.2	59.0
Jacob Jones	New York Ship Building Co.	33.7	32.2	28.6	27.0
Wainwright	New York Ship Building Co.	33.4	31.9	28.1	26.5
DESTROYER TENDERS					
Melville	New York Ship Building Co.	70.2	68.4	65.5	63.8
SUBMARINES					
G-4 (2)	American Laurenti Co. (Phila.)	(3)	Accepted	96.4	95.5
G-2 (1)	Lake T. B. Co. (Bridgeport)	89.7	89.7	89.7	89.7
G-3 (1)	Lake T. B. Co. (Bridgeport)	85.7	85.4	83.0	82.6
K-3	Electric Boat Co. (Seattle)	Delv'd.	10/29/14	99.7	99.7
K-4	Electric Boat Co. (Seattle)	Delv'd.	10/24/14	99.7	99.7
K-7	Electric Boat Co. (San Fran.)	98.1	98.1	98.1	98.1
K-8	Electric Boat Co. (San Fran.)	98.1	98.1	98.1	98.1
L-1	Electric Boat Co. (Quincy)	67.4	63.7	61.7	57.6
L-2	Electric Boat Co. (Quincy)	66.2	62.4	58.8	54.3
L-3	Electric Boat Co. (Quincy)	66.1	62.2	58.3	53.4
L-4	Electric Boat Co. (Quincy)	65.7	61.4	57.3	51.9
L-5	Lake T. B. Co. (Bridgeport)	41.2	35.3	37.5	31.4
L-6	Lake T. B. Co. (Long Beach, Cal.)	41.7	35.5	38.1	32.6
L-7	Lake T. B. Co. (Long Beach, Cal.)	39.7	33.0	36.4	30.5
M-1	Electric Boat Co. (Quincy)	50.6	45.4	44.8	38.9
L-8	Portsmouth, N. H., Navy Yard.	....	....	....	....
L-9	Electric Boat Co. (Quincy)	24.9	18.0	20.0	13.6
L-10	Electric Boat Co. (Quincy)	23.8	16.7	19.3	12.9
L-11	Electric Boat Co. (Quincy	11.2	7.3	4.1	0.0
SUBMARINE TENDERS					
Fulton	New London S. & E. B. Co. (Quincy)	97.8	97.8	94.0	94.0
Bushnell	Seattle Construction & D. D. Co.	71.9	66.6	63.0	54.7
FUEL SHIPS					
Kanawha	Mare Island Navy Yard.	82.4	81.9	78.9	78.3
Maumee	Mare Island Navy Yard.	57.2	56.5	48.8	48.1
MISCELLANEOUS					
Supply Ship No. 1	Boston Navy Yard.	....	....	....	....
Transport No. 1	Phila. Navy Yard.	2.5	0.0	1.3	0.0
PANAMA CANAL COLLIERS					
Ulysses	Maryland Steel Co.	56.8	51.7	50.9	43.7
Achilles	Maryland Steel Co.	51.9	42.2	45.1	35.4

(1) Contracts forfeited, vessels being completed New York Yard.
(2) Conditionally delivered at Phila. Yard 1/22/14.
(3) Department on October 27, 1914, conditionally accepted G-4, the acceptance to take effect as of September 21, 1914.

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Deck-Sheathing Compositions

A Technical Discussion of the Various Materials Used as Flooring for Ships

By John Hamilton Paterson

THE steadily increasing cost of wood sheathing for ships' decks has led to the invention and application of numerous substitutes of a more or less successful nature. These substitutes may be roughly divided into three classes, as follows:

1.—Those made of sawdust, bound together by a stone-like cement, the one usually employed being oxychloride of magnesium. The great proportion of the cements in actual use falls in this class.

2.—Those made of sawdust, cork dust, sand or other earthy materials, bound together with bitumen or a bituminous mixture. These substances are somewhat akin to the asphalt used commonly for road paving, and are used in small quantities on exposed decks by some shipping companies.

3.—Artificial wood itself, made by the strong compression of sawdust with a suitable binder. This substance is almost as expensive as ordinary hardwood, however, and requires as much labor in laying down. It is, therefore, rarely used in Great Britain.

The compositions belonging to the first class are, as already stated, far the most largely used. The saving in cost over wood is twofold, in that the cost of the materials themselves is less than that of wood, and the cost of laying them down is still lower, as they are put down, like cement, with a trowel while in a soft, pasty condition. All depend upon the same chemical reaction for their hardening properties.

When magnesium oxide (commonly known as calcined magnesia) is mixed with a suitable proportion of a solution of magnesium chloride in water, the paste so formed is converted in a few hours to a hard, solid mass, which is only broken with great difficulty, and is capable of taking a high polish. This change is brought about by the chemical union of magnesium oxide with the magnesium chloride, whereby a new substance, known as hydrated magnesium oxychloride, is formed.

Theoretically, this oxychloride cement contains magnesia, magnesium chloride and water, in the following proportions:

Magnesium oxide, 33 per cent; magnesium chloride, 16 per cent; water, 51 per cent.

In practice, however, this proportion is altered by the fact that there is an excess of magnesia present and also a number of foreign substances which existed as impurities in the original magnesia. The large proportion of water in the cement, even when outwardly perfectly dry, is noteworthy, and it is this absorption of water which causes the wet cement mixture to set hard and dry right through in a few hours.

If this cement be subjected to the prolonged action of water, the magnesium chloride is slowly removed and dissolves in the water, leaving a hydrated magnesium oxide which contains 60 per cent magnesium oxide and 40 per cent water. The cement has very strong binding powers; so much so that it will tenaciously hold together more than 20 times its weight of sand.

The sheathing compositions under consideration are made by mixing magnesium oxide and sawdust in the required proportions, together with a suitable coloring matter, such as Indian red or sienna, and then making into a paste with a solution of magnesium chloride. In this condition they are laid on the deck and smoothed over with a plasterer's trowel till a good surface is obtained.

The floor so produced has a number of advantages besides low cost of manufacture. It will hold nails and screws as well as wood, thus permitting large areas to be done in passenger vessels at one time, before the cabin bulkheads and partitions are built, these being fastened down to the floor with ordinary screws. It is quite fireproof and non-inflammable, comparatively noiseless to walk upon, and, being a poor conductor of heat, is warm to the foot. When laid in saloons, it can be polished with beeswax to as smooth a surface as wood, and, if properly colored, has a very pleasing appearance.

Must Be Skillfully Laid

The necessity for preparing and laying such a floor with skill and due precaution, however, cannot be too strongly emphasized, as neglect of these essentials may cause rapid corrosion of the steel deck under the floor. Cases are by no means unknown where thousands of pounds have had to be spent on repairs to steel decks so covered on comparatively new ships.

The reason for this trouble is not far to seek. If a piece of one of the compounds be examined under the microscope, it will be found to be full of quite large holes, mostly communicating with one another. It follows, therefore, that these substances are porous, and water can percolate through them without much difficulty. If the compound should, through bad mixing, contain an excess of magnesium chloride, it follows that the water which reaches the steel deck will contain this magnesium chloride, and, as is well known to engineers, such a solution is powerfully corrosive. If the composition, with the defect noted, is laid in an exposed position, such as a weather deck, or if it is washed down daily with water, as in an alleyway, it will not be long before the air dissolved in the water, aided by the magnesium chloride, will have caused serious corrosion of the steel deck.

It is obvious, therefore, that great care should be taken that the compound does not contain an excess of magnesium chloride, but rather an excess of magnesia, which has no action on steel. Even this precaution, however, while lessening the danger of corrosion, does not obviate it, as the magnesium oxychloride, of which the cement is formed, splits up slowly in the presence of water, as previously shown, producing free magnesium chloride, and hence corrosion.

Corrosion of the Deck

As corrosion of the deck underlying the composition is not caused by the composition itself, but by the water and air which penetrate it, it is evident that a sheathing material, which is waterproof and strongly adherent to the deck under it, would be quite safe under any conditions. Up to the present, however, so far as the writer knows, no completely satisfactory solution of this problem has been found.

Much can be done by taking care to use only fine sawdust and to mix it very thoroughly with the magnesia, as examination shows that a great proportion of the holes in the com-

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position are caused by the insufficient adherence of the cement to the rough and awkward sides of large sawdust particles. The addition of gelatinous bodies, such as precipitated magnesium silicate, has been tried and even patented, under the supposition that they would close up the pores, but they only make the mixture hard to lay down and are not very effective.

The impregnation of the composition with resinous bodies, after it has been laid down and allowed to dry, has been tried; but as these do not penetrate very far the surface is soon worn off, leaving the substance as porous as before.

Of late years a number of substances have been introduced which are laid on the deck itself before the composition is laid down, and which prevent the magnesium chloride solution, even when it does leak through, from getting at and corroding the deck. One method employed is to apply a thick coat of a hot bituminous mixture to the deck, and, while it is still soft, to strew its surface with granite chips. The sheathing composition is then laid on this, and is keyed onto the smooth surface of the bitumen by the pieces of granite. Another method consists in the application of a substance which is painted on the deck and which, when attacked by magnesium chloride, forms a hard, insoluble compound. The idea is that the greater the quantity of magnesium chloride which leaks through onto such a coating, the harder and more resisting will it become.

The writer's experience leads him to believe that such coatings are effective, provided that they are somewhat elastic and can be applied in thin layers. It will be readily understood that a thick layer of a protective coat laid between two bodies of widely differing physical properties, such as steel and magnesia cement, is bound to be subjected to great strains, due to the difference in the elasticity and the co-efficients of expansion of the two bodies. In one ship examined by the writer the protective layer was found ground to powder after having been laid only nine months.

Oxychloride Compositions

Another drawback to the use of oxychloride compositions is caused by the fact that, during the hardening process and even for some time after, they expand considerably. As the substance is firmly held to the deck by its own adhesion, and usually also by special "cleats", it follows that a considerable strain is set up in the material. If, for any reason, the adhesion to the deck is not good, this strain results in the lifting and cracking of the composition—circumstances which help the admission of water, and consequent corrosion of the deck, very greatly. Some firms adopt measures to minimize the danger of expansion, but these, in all fairness to the firms in question, cannot be dealt with here.

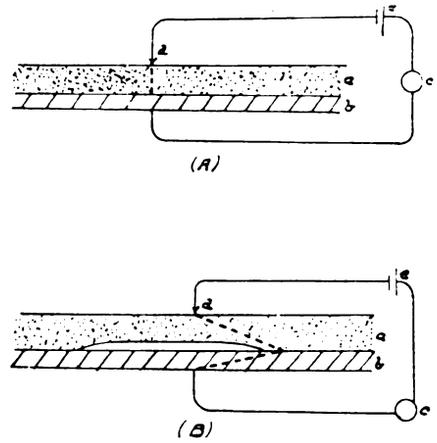
There can be no doubt that some compositions as laid down are unsatisfactory and even dangerous; but, given rigid adherence to certain conditions, they are as safe as, or even safer than, wood or other deck sheathings. A few of these conditions are:

(a) The limiting of the use of oxychloride compositions to floors not exposed to the weather.

(b) The careful supervision and preparation of the binding mixture.

(c) The use of the proper quality and texture of sawdust.

(d) The use of an effective anti-



(a) Deck sheathing composition
(b) Steel deck
(c) Measuring instrument
(d) Movable point
(e) Battery

The Dotted Lines Show the Path of the Current in the Composition

corrosive mixture between the deck and the composition. It is of importance that this mixture should adhere well to the deck, and that the composition should adhere well to the mixture.

(e) The use of a sufficient number of cleats of ample area to hold the composition down.

(f) The careful scrutiny of the anticorrosive coat for flaws and non-adhering patches. No coating should be used which will not stand a considerable amount of foot traffic over it without coming off. Some of the substances laid down at present have the appearance and wearing properties of whitewash, and they are almost useless by the time the sheathing composition is laid on top of them.

If the Board of Trade and the insurance corporations, instead of looking on these substances with a dubious eye, were to issue two or three definite regulations as to their manufacture and present simple tests which samples of the material *actually being laid down* must pass, the unpleasant feeling of uncertainty concerning them would soon be a thing of the past.

It is often of great importance to know whether a composition when laid is actually holding to the deck, and the writer has found the following method to afford ready means of telling whether this is so.

Provided that the composition is mixed evenly and is of uniform thickness, the layer applied to the deck offers a fairly high and uniform resistance to the passage of an electric current. If, therefore, one pole of a steady source of current be earthed, that is, connected to the steel deck, and the other pole be connected to a small metal disc which is laid on the top of the sheathing composition, the amount of current which passes through the composition at any part of the deck will be constant, and can be measured on an ammeter or other suitable instrument included in the circuit. The diagram (A) in Fig. 1, in which the thickness of the steel deck and the composition are purposely exaggerated, shows the necessary connections, and the dotted line the path of the current through the composition.

If the composition is not adhering to the deck, the current will be compelled to take the path shown by the dotted lines in diagram (B); and as it has much further to travel through the composition, the resistance to its passage will be greater, and hence the current registered will be less. By moving the small disc about on the cleaned surface of the composition, therefore, and watching the measuring instrument, it is quite easy to tell where the composition is adhering and where this is not the case.

In practice it is convenient to use a megger and bridge ohmmeter to measure the resistance of the sheathing composition. Instead of a disc, a heavily weighted brass ring, supported on three short feet with narrow ends (about ⅛ inch in diameter) is used to make contact on top of the composition. An arrangement of this kind is essential to ensure that the actual area of contact is the same at each measurement and is not altered by slight local unevenness of the surface.

Non-Conducting Substances

Needless to say, this method is of no value when highly non-conducting substances, such as bitumen, are used as a protective layer.

The compositions of the second class which employ bituminous materials to bind together the sawdust instead of the oxychloride cement, have cer-

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tain properties to recommend them, but suffer, on the other hand, from many disadvantages. They are completely waterproof and have no action on iron or steel. They adhere well to iron, and have a considerable degree of elasticity which prevents them from cracking. They are warm to stand on and quite noiseless to walk over. They are also considerably lighter than the oxychloride compositions.

As to the disadvantages, these compositions are all black or brown in color and cannot be given other colors. They have a rough surface and will take no polish. They are highly inflammable, and when strongly heated give off large quantities of inflammable gas. They soften at temperatures above 90 degrees Fahr., and are therefore not of any use for ships trading in hot climates or for spaces above the boilers. They will not hold nails or screws. Some of them when warm have a distinct odor, which in confined spaces becomes very unpleasant after a time.

The attention of Mr. F. A. Byerley of Byerley & Sons, manufacturers of Byerlyte, was directed to the concluding paragraphs of Mr. Paterson's article and he said:

"Byerlyte floors, I am happy to say, possess all the advantages which Mr. Paterson refers to and do not have the objections to which he refers. As you are aware Byerlyte floors are furnished either in black or red and they are rubbed down to a perfectly smooth true surface. It may be true that they cannot be polished as he speaks of polishing wood or compositions of wood as also the cement compositions, but, this is a minor matter and one that can in no way be of any particular advantage to the floor as the polish would not be lasting.

"Byerlyte floors are fire-proof, the composition being such as to resist fire and heat. This being the case they certainly cannot be inflammable, especially so as the major part of the composition is a mineral aggregate, the bituminous binder being the smallest part. This bituminous binder which we use to hold the mineral aggregate together has a flashing point considerably above 600 degrees Fahrenheit and when in combination with the mineral aggregate this flashing point is materially increased. It goes without saying that any such temperature as this would never be possible except in a total destruction of the boat by an internal fire.

"That Byerlyte floors do not give off large quantities of inflammable gas will say, that the floors are applied at a temperature approximately 400 and are then only in a plastic condition at which time only the very slightest vapor is detectable. That they will soften at a temperature of 90 degrees Fahrenheit is also overcome in Byerlyte floors as bituminous binder has a melting point well above 200 degrees Fahrenheit. The melting point of the material is very much increased by the mixture of the mineral aggregate.

"On a recent test of a Byerlyte floor laid directly over the main steam pipe on one of our large lake boats it was found that a temperature well above 200 was attained. A certified thermometer set on the flooring registered 190. At this temperature Byerlyte floors did not soften to such an extent as to render them unfit for use. While it is true at this temperature they softened, but, the decks were used constantly.

"Will say another good feature of Byerlyte flooring is that there is absolutely no odor whether the flooring is laid in a confined space or on the open deck, and this is true at any and all temperatures. Further than this, Byerlyte floors are sanitary. They are proof against vermin or germs, and are the only floors that will satisfactorily meet all the conditions of vessels trading in the hot climates."

Cap Trafalga-Carmania Fight

An officer of the Carmania, in a letter home, describes the sinking of the German armed merchant cruiser Cap Trafalgar by the Carmania. He says:

"We sighted the ship about 10 a. m. on Sept. 14, in the South Atlantic. She was coaling from a collier, and two others were standing off. On sighting us the Cap Trafalgar hurried off, mothering the collier, and soon after the latter steered to the eastward and the Cap Trafalgar proceeded southwards. We steamed after her at top speed, and when about four miles off she turned and steamed towards us.

"We were cleared for action, and had been standing by our guns for some time, all strangely fascinated by the movements of our enemy. When about four miles off we fired our challenge shot across her bows, and immediately after this she displayed her colors at the masthead, and fired her first shot from her starboard after guns. This shot came mighty close over our heads, dropping in the water.

"Then the firing from both ships became fast and furious; projectiles and splinters from bursting shells showered around us. The engagement commenced at 12:10 midday, and lasted hot until about 1:10 p. m., when she showed signs of having been badly hit, and was taking a heavy list to starboard, being on fire fore and aft. We were also on fire on our fore-bridge, our bridge telegraphs and steering gear were completely wrecked, and the captain's cabin, the chart-house, and a number of officers' quarters were gutted. We were also badly holed by her gun fire.

"When we found we had crippled our enemy, and that she was sinking, we ceased firing, although her colors were still flying. She gradually listed over until her funnels nearly touched the water. Then she settled down forward until her second funnel almost disappeared. At last she rolled over, showing her keel and propellers, stood up on end, and gradually assumed a perpendicular position, and dived out of sight. We could make out some boats with survivors, and one of the colliers rendered assistance. We had to clear away because low down on the horizon the signalman saw the smoke and what appeared to be the German cruiser Dresden.

"We steered away south, and then doubled on our course, by that time darkness was setting in, and we thus escaped her clutches. From the time we fired our first shot until the Cap Trafalgar disappeared was one hour forty minutes. About 200 souls must have perished on board her. We had five killed, four died of wounds, and about 35 were wounded. This battle was a real duel, probably the only one of its kind on record. The Cap Trafalgar was about our own size, and carried a similar number of guns."

Watch Officers on American Ships

Supervisor Inspector George Uhler of the Steamboat Inspection Service has sent to the various inspectors the following interpretation of the executive order suspending the provision that watch officers on foreign ships admitted to American register under the recent ship registry bill shall be American citizens:

"It is understood that under the provisions of this Executive Order all watch officers of American ships must be American citizens, except the watch officers of foreign-built ships admitted to American registry under the provisions of an Act approved August 18, 1914. These officers must hold a license issued by the Steamboat-Inspection Service, but in the examination of such officers for United States license the requirement of American citizenship is waived, for a period of seven years.

"Inspectors will, therefore, admit to the examination for United States license any person serving as a watch

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officer upon such foreign-built ships at the time they are admitted to American registry, but this exemption will not apply to any alien who is not employed as a watch officer of a foreign-built ship admitted to American registry under this Act.

"When a vacancy occurs within the next two years from September 4, 1914, among the watch officers of a foreign-built ship admitted to American registry under this Act, such vacancy may be filled by an officer without regard to citizenship. Such officer must hold a United States license, but the requirements of citizenship as a qualification for examination is waived and any person may present himself for examination for license to fill such vacancy without regard to his citizenship or the condition of service on foreign-built ships admitted to American registry.

"By the same order the President has exempted from inspection by this Service for a period of two years from Sept. 4, 1914, all foreign-built vessels admitted to American registry under the provisions of the Act herein referred to, except such inspection as will be necessary to determine whether or not such vessels are fit to carry dry and perishable cargo, as referred to in Department circular No. 240, dated Aug. 24, 1914.

"GEORGE UHLER,
"Supervising Inspector General."

Parsons Steam Turbine Co.

The annual report of the directors of Parsons Marine Steam Turbine Co. states that during the past year the works have been fully occupied in the construction of machinery for war and mercantile marine vessels, and the orders on hand will keep them fully employed during the current year. Up to the present time the total horsepower of marine turbines of the Parsons' type, completed and under construction in the works of the company, and of licenses, as well as in the works of the Continental sub-companies, and licenses of Parsons' Foreign Patents Co., Ltd., amounts to about 12,360,000 horsepower, an increase during the year of about 1,760,000 horsepower. Of this total nearly 10,510,000 horsepower is, or will be, employed for propulsion of warships, and over 1,850,000 horsepower in vessels of the mercantile marine and yachts. The application of geared turbines to marine propulsion continues to be greatly extended both for vessels of the mercantile marine and for vessels of war, and the vessels fitted with this system are giving every satisfaction.

Since the issue of the last report, vessels have been ordered to be fitted with geared turbines for the Cunard company, the Federal Steam Navigation Co., the Union Steamship Co. of New Zealand, the Canadian Pacific Railway Co., the Oceanic Steamship Navigation Co., the Ellerman Line Steamship Co., the Venice-Alexandria Line, etc. The number of war vessels, passenger and cargo vessels now built or building, with all-geared or part-geared turbine machinery, included in the above totals, is 126, with an aggregate of about 1,000,000 horsepower, 62 such vessels with a total of 620,000 horsepower have been ordered since the date of the last report.

Experimental investigation on propeller efficiency, carried out in the company's tank, have given very valuable information, more especially in regard to the most suitable revolutions and pitch ratios for geared turbine installations for attaining the highest efficiency in the various classes of vessels. The sum of $75,000 has been expended during the year on further experiments with gearing, blading, etc., the benefit of which has been shown in the satisfactory results obtained.

Bids for Torpedo Boat Destroyers

Bids opened at the Navy Department for six torpedo boat destroyers showed that the Fore River Ship Building Corporation, Quincy, Mass., had submitted the lowest estimates for two vessels under Class 2, providing that the hull and equipment and specifications are to be in accordance with those of the department, while the machinery is to be of the bidder's design. The Fore River bid for two vessels under this class was $795,000 each. The William Cramp & Sons Ship & Engine Co., Philadelphia, was the lowest bidder on three vessels under Class 1 to be constructed in accordance with plans and specifications provided by the department, including hull and turbine propelling machinery. This company's bid on three vessels was $834,000 each.

Three was the highest number of vessels that any single company, out of the six bidders, submitted figures on, and some made two distinct figures under Class B to denote the kind of turbine to be used. Construction of the vessels is to be completed within from 21 to 24 months, and speeds provided 29½ and 30 knots per hour.

The bids in detail follow:

Newport News Ship Building & Drydock Co., Newport News, Va., two vessels, Class 2, $885,000 each; two vessels, same class, Curtiss turbine, $875,000; Union Iron Works, San Francisco, Cal., two vessels, Class 1, $880,000; Bath Iron Works, Bath, Me., one vessel, Class 2, $864,000; two vessels, same class, $850,000; three vessels, same class, $850,000; Seattle Construction Drydock Co., Seattle, Wash., one vessel, Class 2, $873,000; two vessels, same class, $860,000; Fore River Ship Building Corporation, one vessel, Class 1, $872,000; two vessels, same class, $852,000; one vessel, Class 2, $889,000; two vessels, same class $867,000; one vessel, same class, with modifications, $815,000; two vessels, same class, with modifications, $795,000; William Cramp & Sons Ship & Engine Co., one vessel, Class 1, $859,000; two vessels, same class, $847,000; three vessels, same class, $834,000; one vessel, Class 2, $853,000; two vessels, same class, $841,000; three vessels, same class, $830,000; one vessel, same class, with modifications, $845,000; two vessels, same class, with modifications, $834,000; three vessels, same class, with modifications, $825,000.

Congress last June authorized these vessels, with the provision that each was not to exceed in cost $925,000 each, exclusive of armament. They will be the largest vessels of this type ever built for the navy, and will have a displacement of 1,110 tons, each to carry four 4-inch rapid-fire guns, four torpedoes and two one-pounder automatic anti-aircraft guns. It is an innovation of the United States navy to install guns meant to prevent attack by aircraft.

Bids for eight submarines, not to cost more than $4,460,000, will be opened at the Navy Department on Dec. 15. One submarine is to be of the seagoing type, with a surface speed of not less than 20 knots, and seven are to be of the coast and harbor defense type. If it is possible to obtain more submarines within the amount appropriated their construction is authorized. It is specified that at least three of the coast defense submarines shall be built on the Pacific coast, if the bids submitted from that quarter do not exceed the cost on the Atlantic coast plus the cost of transportation from the east to the Pacific.

The Hamburg-American Line has $27,000,000 in idle ships for sale, 43 vessels being held at American ports. The company is reducing its forces, but the German law does not permit of the discharge of crews, unless they are returned to Germany, and this cannot be done at this time. Thus the maintenance of these men has cost the company $3,500,000 so far, not counting $2,000,000 lost in returned passage money.

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THE MARINE REVIEW

VOL. 44 CLEVELAND DECEMBER, 1914 NEW YORK No. 12

SHIP BUILDING AND FITTING-OUT

¶ The March issue of MARINE REVIEW will summarize Ship Building and Fitting-Out throughout the United States.

¶ All work that is underway in ship yards will be chronicled and reports received from all steamship lines regarding Fitting-Out Plans.

¶ Every manufacturer who makes ship and shipyard equipment will find an advertisement in this issue profitable.

¶ The Ship Building and Fitting-Out Number will be a great sales agent.

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Alphabetical List of Advertisers, page 28 "Where-to-Buy," page 24 Classified Advertisements, page 23

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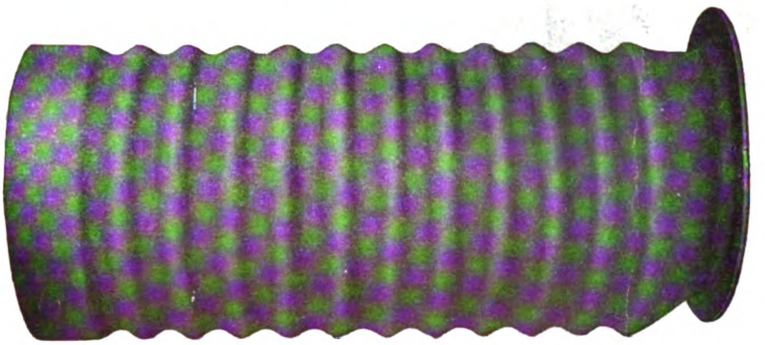

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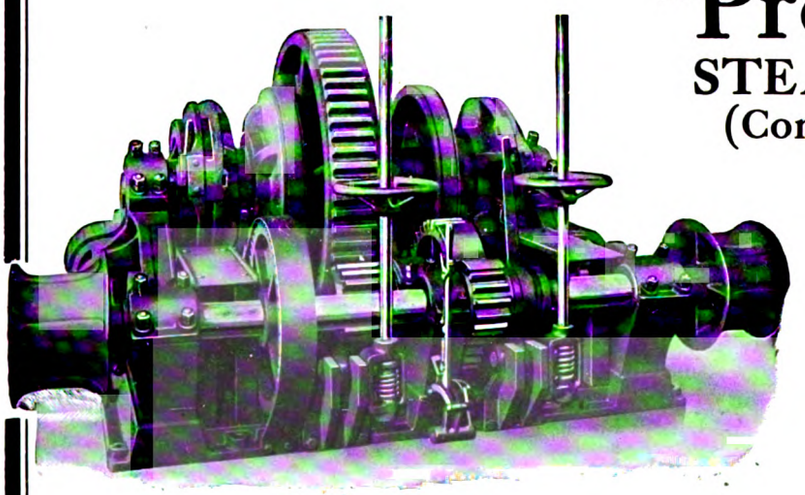

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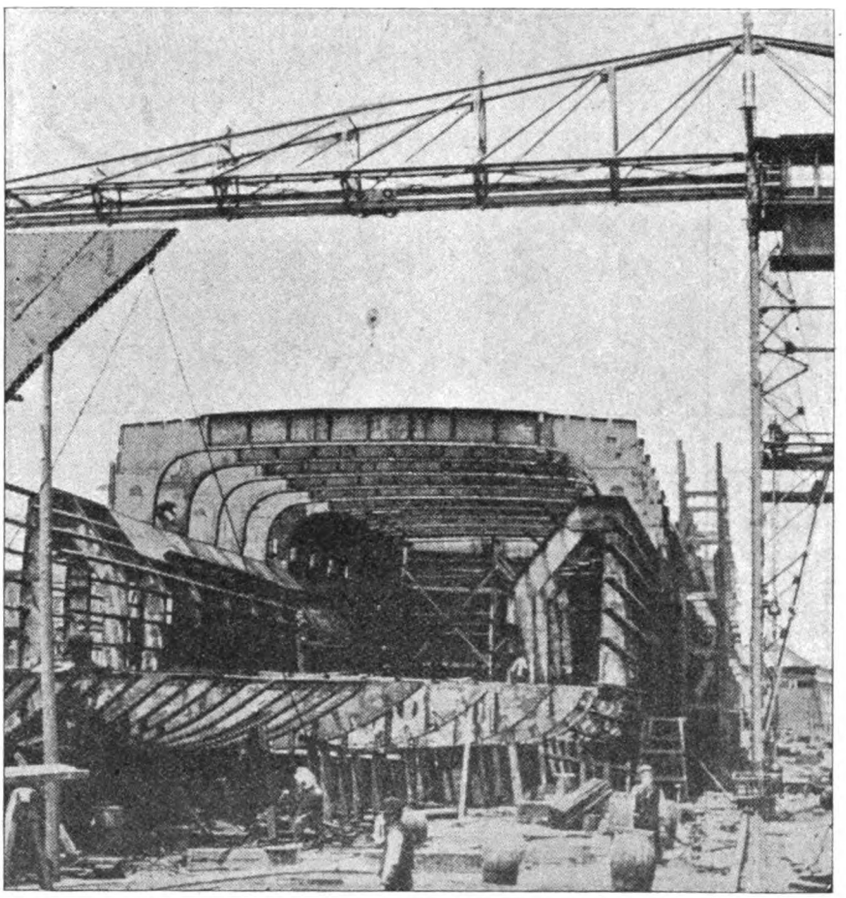

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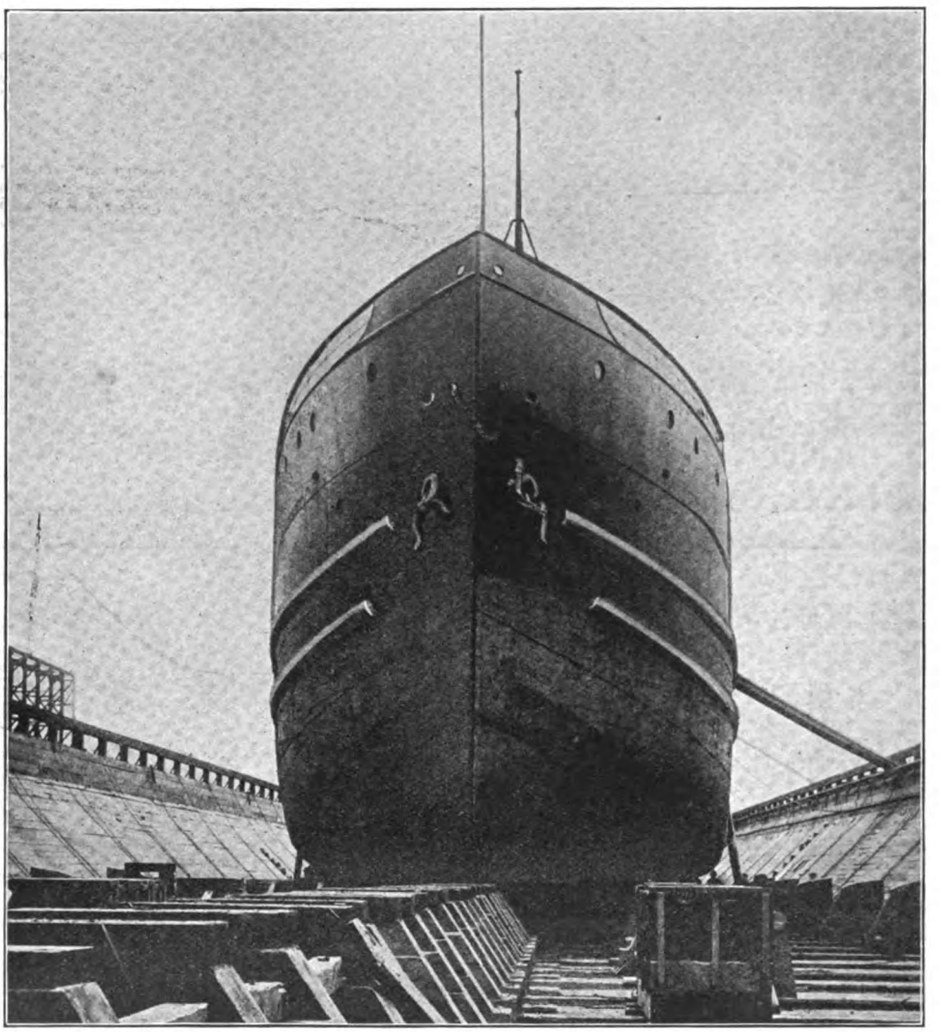

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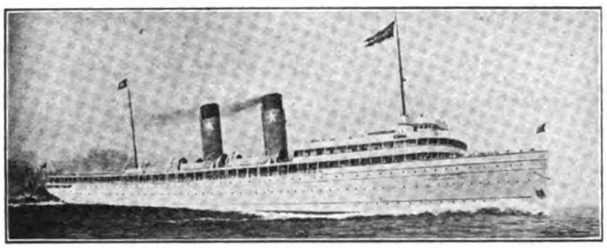

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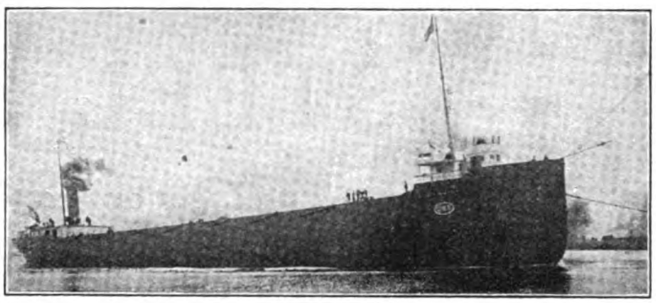

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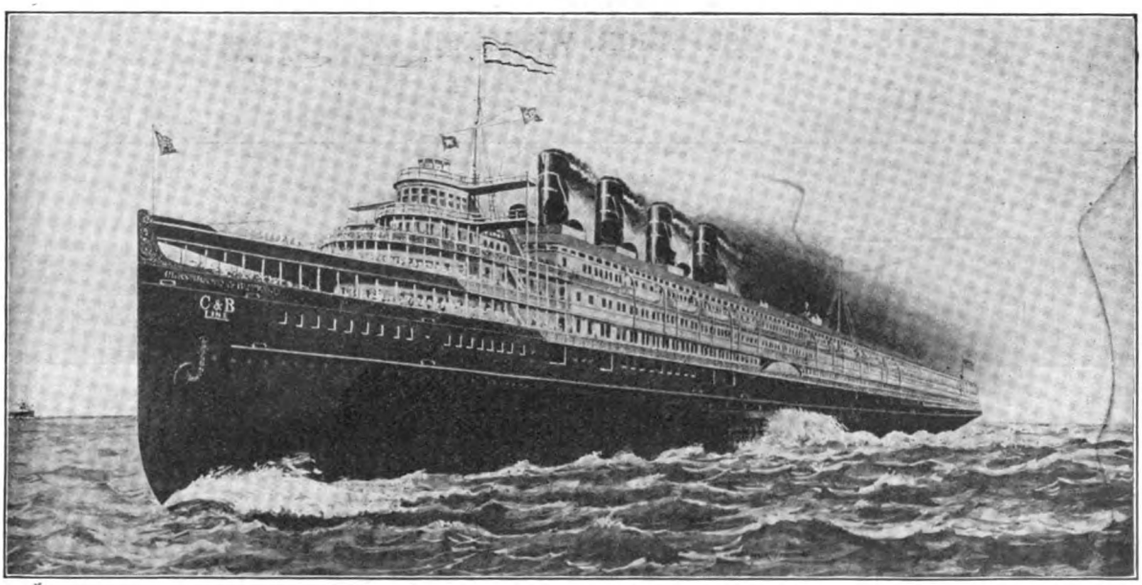

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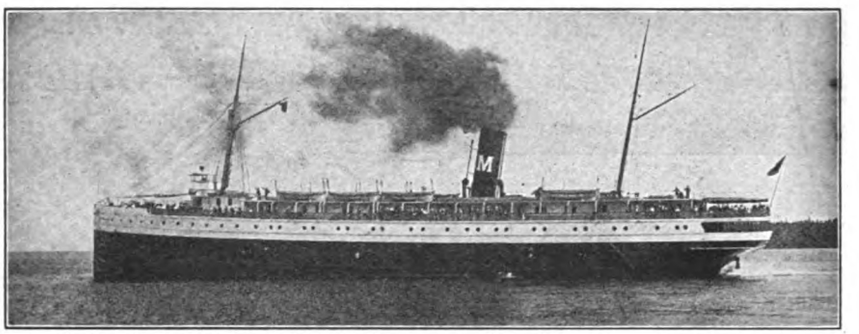

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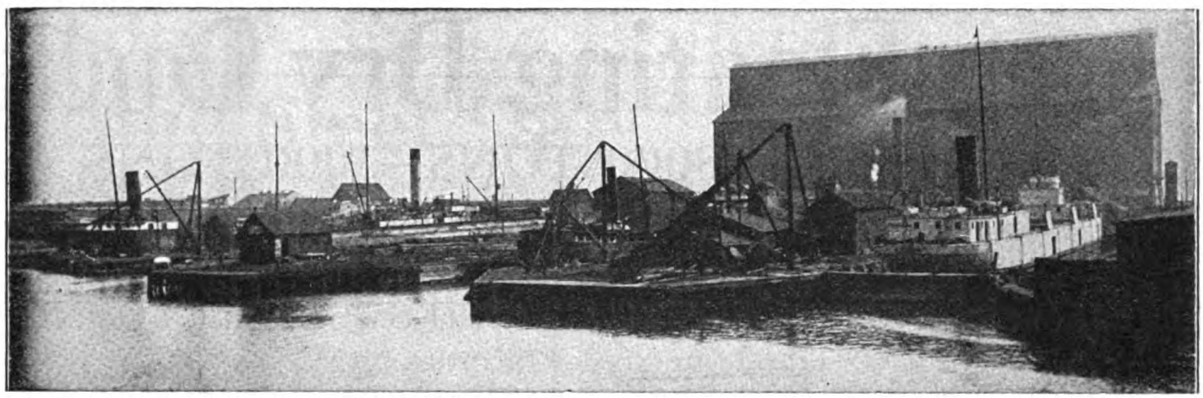

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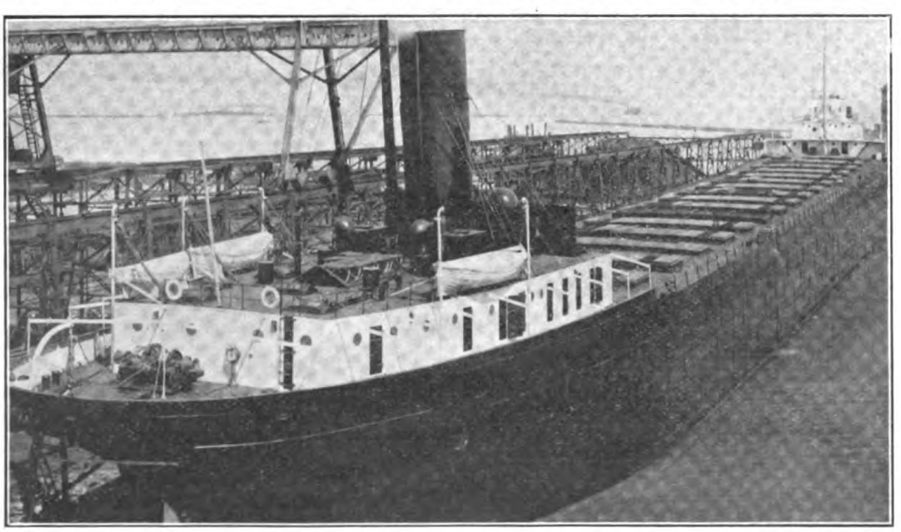

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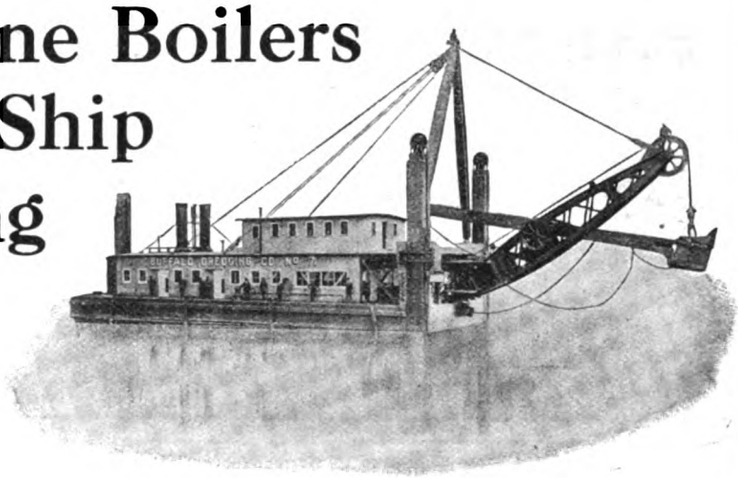

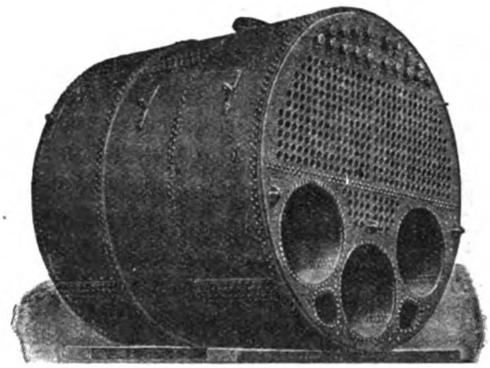

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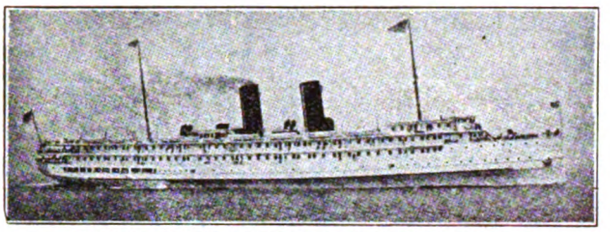

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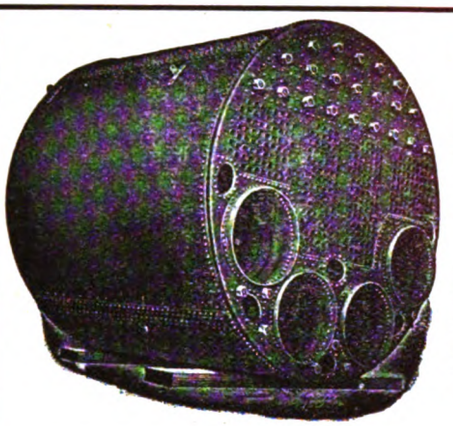

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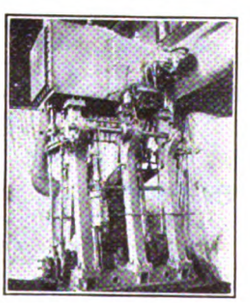

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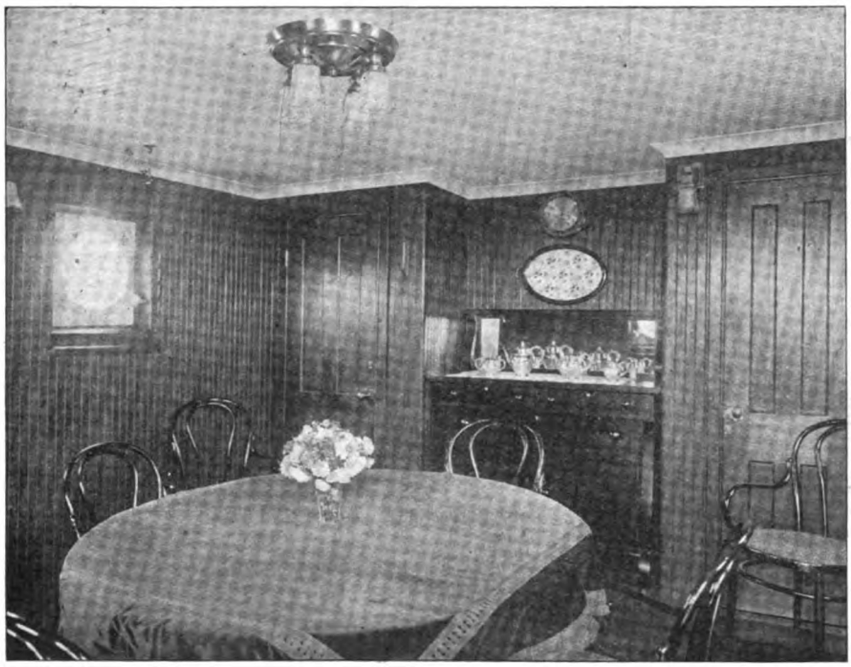

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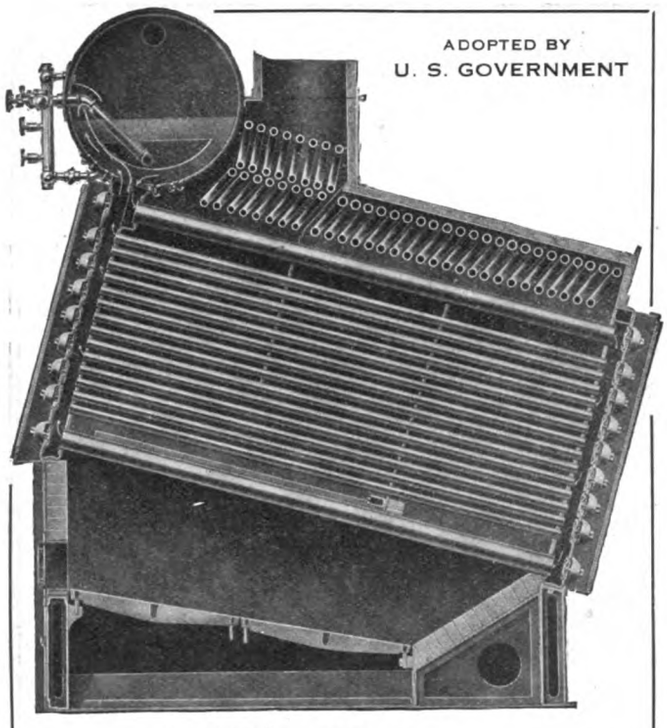

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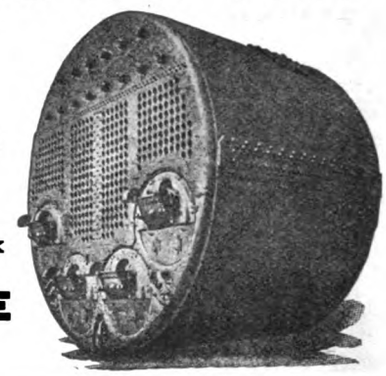

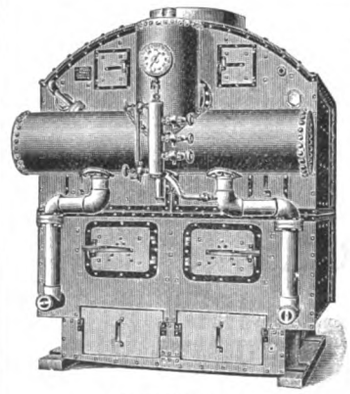

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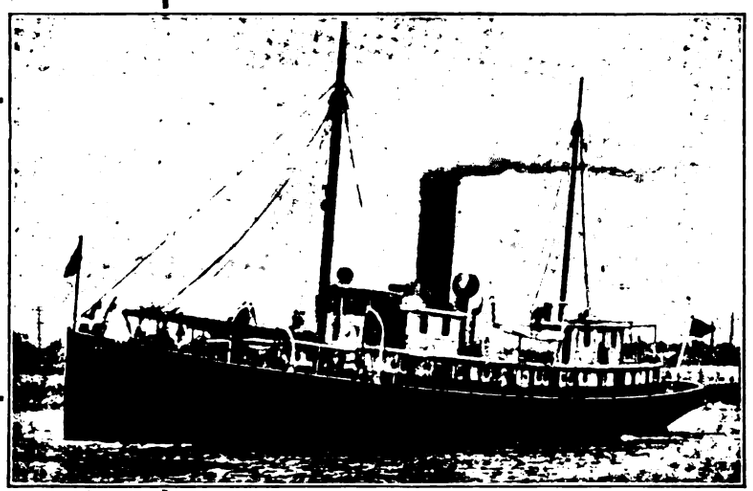

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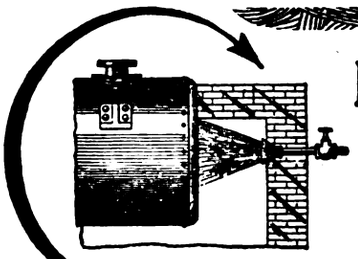

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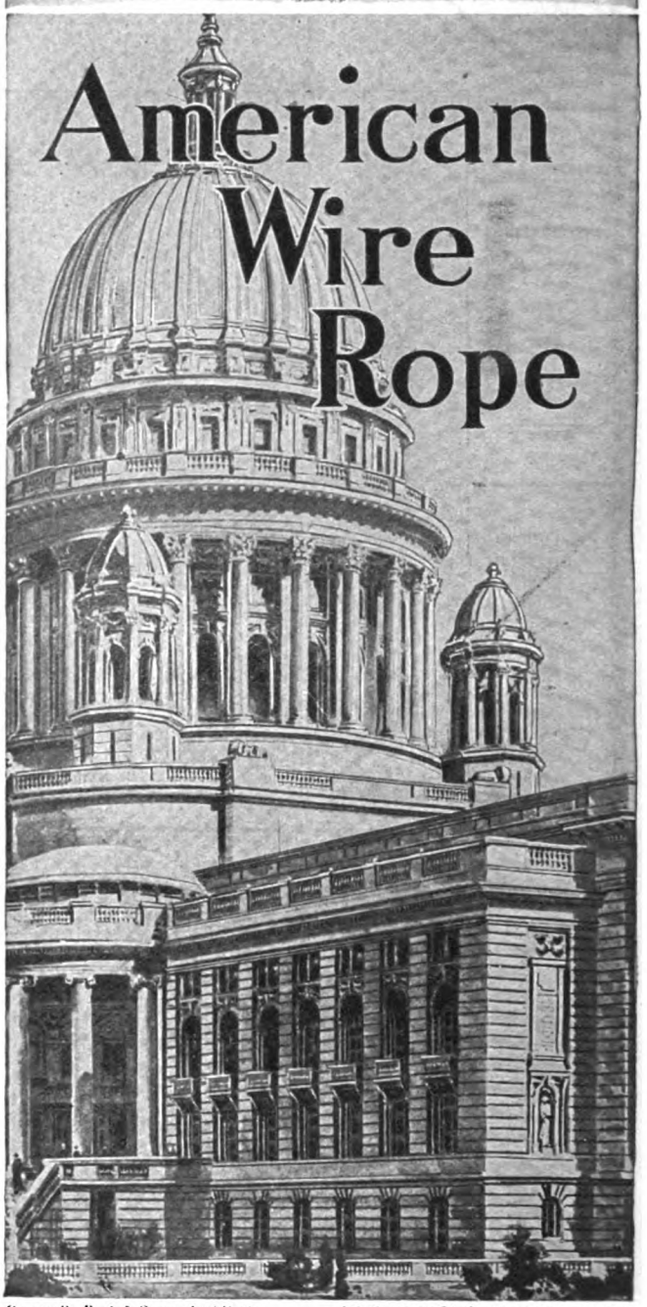

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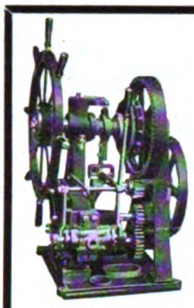
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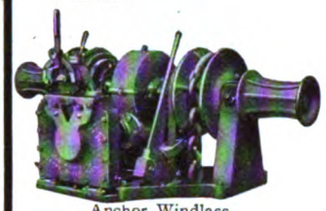
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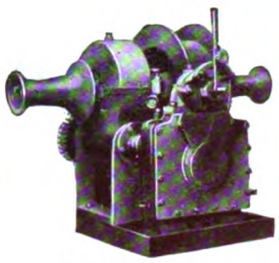
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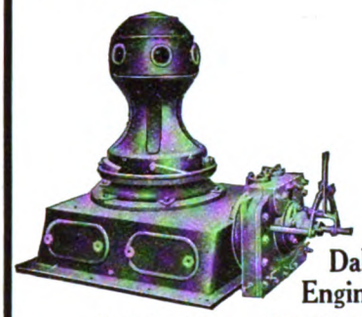
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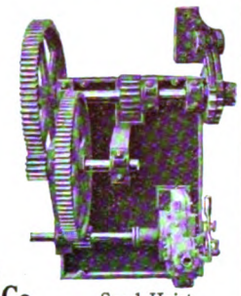
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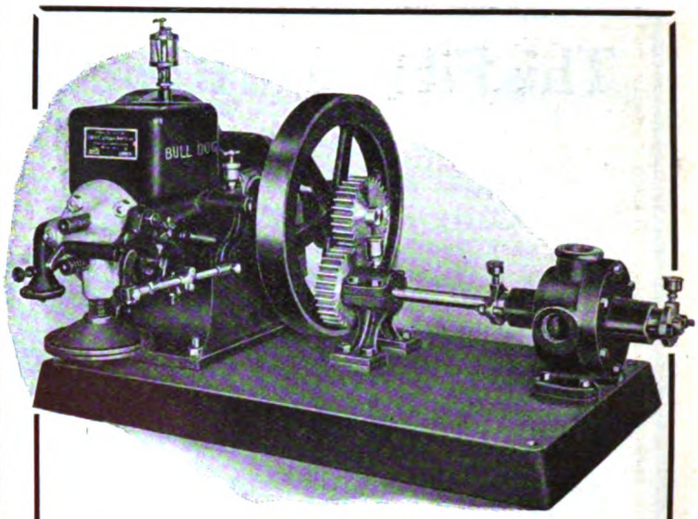

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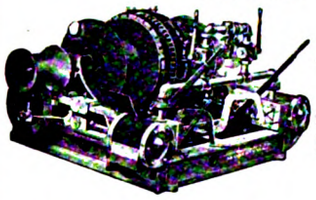

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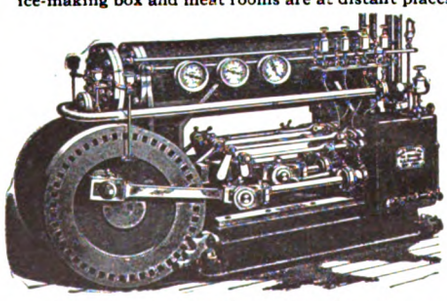

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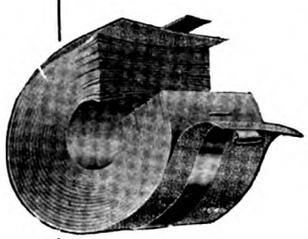

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Famous for their QUALITY and ECONOMY

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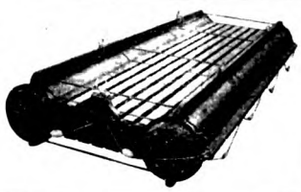
305 Vernon Avenue **LONG ISLAND CITY, N. Y.**



Federal Boiler Inspection Easily Taken Care of by Falls Hollow Stays

ANY SIZE, OUTSIDE OR INSIDE DIAMETER.
AVERAGE LENGTH OF HOLLOW BARS EIGHT TO TEN FEET.
FALLS HOLLOW STAYBOLT CO.
STAYBOLT BARS
BOTH HOLLOW AND SOLID,
MADE OF BEST QUALITY DOUBLE REFINED CHARCOAL IRON OR STEEL.
CUYAHOGA FALLS, O. U.S.A.

They eliminate drilling expenses and make unfailing tell-tales on fractured or broken stays. They possess double the endurance of Solid Stays, and are a proof without test against broken stays

FALLS HOLLOW STAYBOLT CO.

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NAVY STANDARD BINNACLE

RITCHIE

Compasses, Binnacles,

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SOLD IN ALL PARTS OF THE WORLD

Magnets for Adjusting Purposes.

E. S. RITCHIE & SONS

BROOKLINE - MASS.

ANDREW J. MORSE & SON, Inc.

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ESTABLISHED 1837

Diving Apparatus and Submarine Armor
Fire Department Supplies
The Morse Monitor Nozzle

LIFE PRESERVERS

Cork Cushions, Fenders, Cork Ring Buoys

"Ye Oldest Cork House in America"

ESTABLISHED 1865

JUSTUS BRAUER & SON

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Marine Oils

To protect your engine, be sure of the lubricant.

The danger from incorrect lubrication is real but not always apparent. Lack of lubricating quality in the film of oil between moving metal surfaces is too frequently the cause of burned out bearings, scored cylinder walls, excess fuel consumption and unnecessary and costly repairs.

Gargoyle Marine Oils will furnish ample protection against such needless losses. For nearly fifty years, they have set a world standard of quality, efficiency, and durability in marine lubrication.

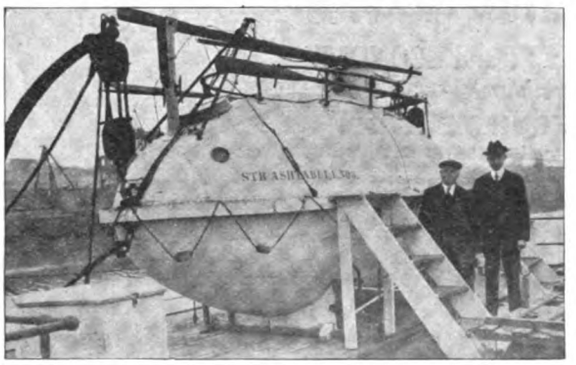
There is a grade of Gargoyle Marine Oil for each type of service and because of the peculiar fitness of each oil for its particular task, exceptional economy is obtained.

Among the famous Gargoyle Marine brands are, Gargoyle Dark Marine Cylinder Oil, Gargoyle No. 1 Marine Engine Oil and the Gargoyle D. T. E. Oils for turbines.

Specialists in the manufacture of high-grade lubricants for every class of machinery. Obtainable everywhere in the world.

Vacuum Oil Company

Rochester, N. Y., U. S. A.



Showing a Brude Lifeboat installed on the Steamship Ashtabula, fitted out with the Raymond Releasing Hook, and Star Non-toppling Block.

Shipowners of the Great Lakes!

Humanity Appeals to You

Are you going to protect sailors' lives in future? You can do so by installing BRUDE LIFEBOATS on your vessels. Being unsinkable, non-capsizable, navigable, non-swampable, offering complete protection against cold, exposure, spray and rough weather, the BRUDE LIFEBOAT would have saved the hundreds of sailors who found watery graves after great suffering in the recent LAKE CATASTROPHE. One 18 ft. boat will save any ordinary ship's crew. The Brude boat has sailed across the Atlantic in midwinter, thereby demonstrating its unique seaworthiness, efficiency and general utility. It is the only boat in the world worthy of the name LIFEBOAT. The others are in most cases "deathboats".

Now is the time for action.

KONRAD FURUBOTN, General Agent, Brude Lifeboat

8 Bridge Street **NEW YORK, N. Y.**

I. O. C. Single Unit Generator

It's All In Your Favor

to make Oxygen and Hydrogen on your own premises instead of buying in cylinders,—if you install an

I.O.C. SYSTEM PLANT

The I. O. C. System is absolutely safe—automatic, and the recognized leader with a long service record in both this country and abroad.

Gases 100% efficient
Supply definite and at lowest cost

Send for full particulars

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LANE LIFE BOATS

C.M.LANE LIFE BOAT CO.,
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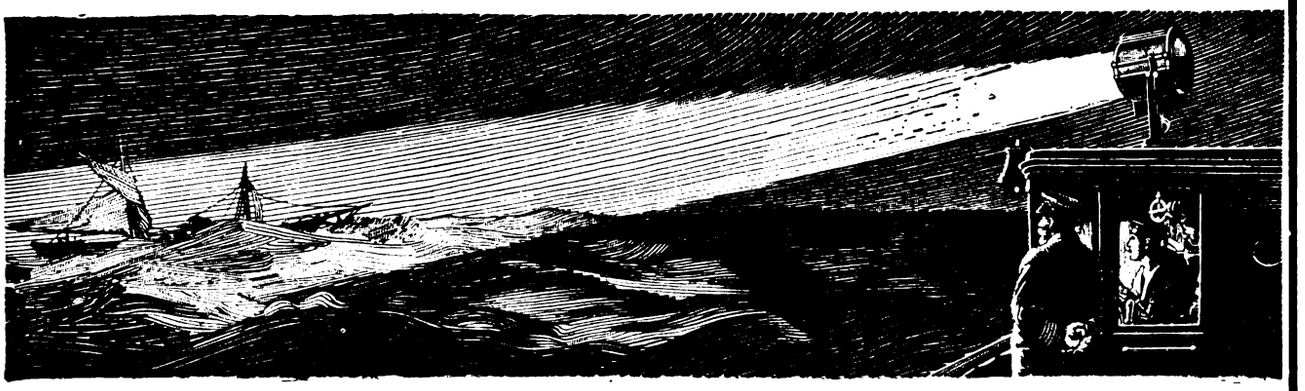

The Derelict is Safely Passed

By the Boat Equipped with the General Electric Company's Searchlight

Many other hazards of the sea are discounted by the bright rays of the modern searchlight. It picks up buoys, icebergs, landmarks, docks, etc., long before they become danger marks, and its value in rescue work cannot be overestimated.

Put a G-E Searchlight on Your Boats

The cost may be saved in a single day. The advantages of having electric service will pay good dividends in the long run at sea.

Here are some of the G-E Products made especially for Marine Work

Internal Combustion Generating Sets	**MAZDA Lamps**	**Meters and Instruments**	**Electric Bake Ovens and Ranges**
Steam Engine Generators	**Arc Lamps**	**Wire and Cable**	**Electric Radiators**
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		Motors	

Ask our nearest office for bulletins and further information

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General Office: Schenectady, N.Y.

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(Office of Agent)
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Rochester, N. Y.
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For Texas, Oklahoma and Arizona business refer to Southwest General Electric Company (formerly Hobson Electric Co.)—Dallas, El Paso, Houston and Oklahoma City. For Canadian business refer to Canadian General Electric Company, Ltd., Toronto, Ont. 4839

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GREAT LAKES ENGINEERING WORKS

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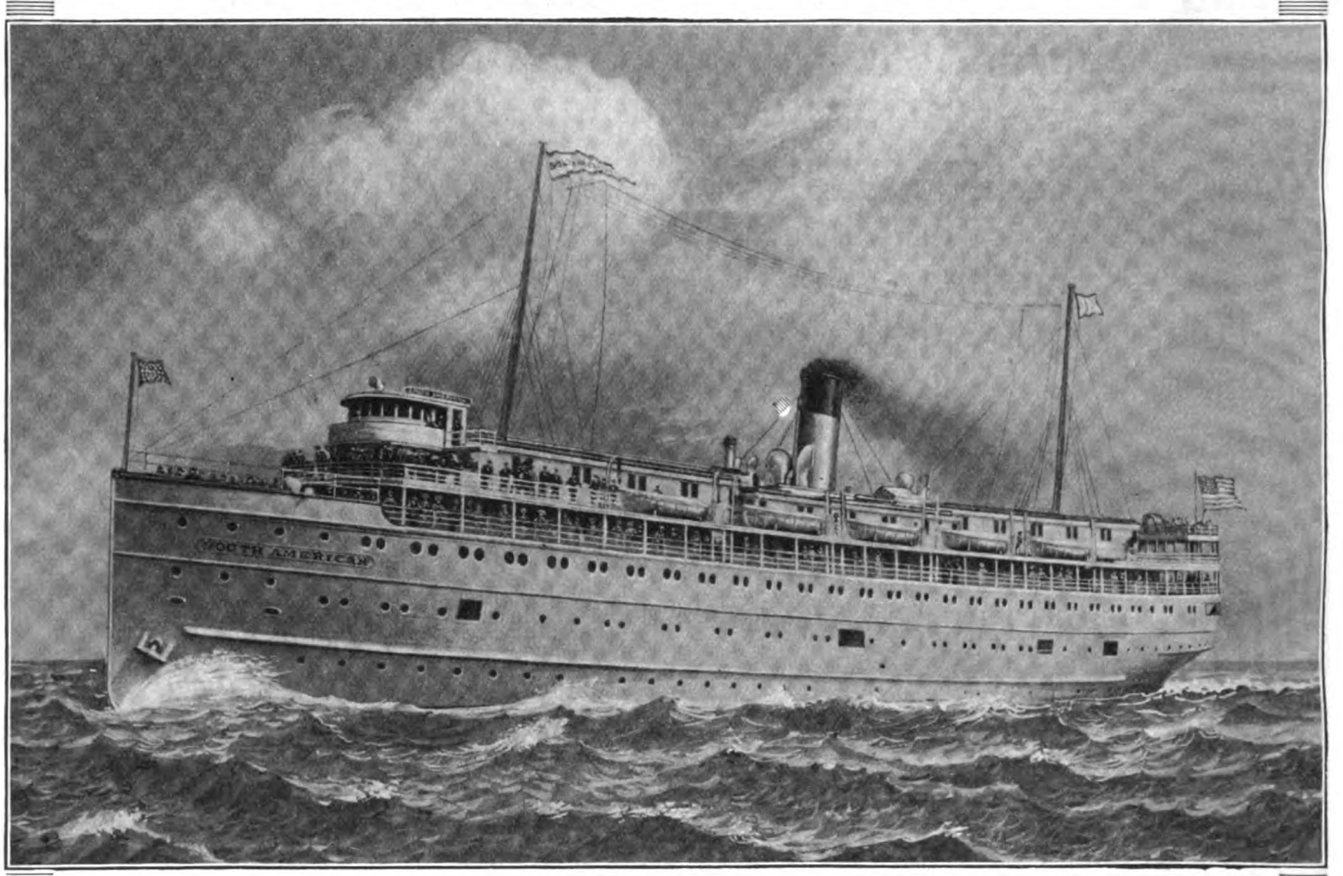
Steamer "South American"

Exclusively a Passenger Steamer. The Largest on the Great Lakes.



Steamer "NORTH AMERICAN" - - 500 passengers
Steamer "SOUTH AMERICAN" - - 540 passengers

Designed and Built by

Great Lakes Engineering Works

DETROIT, MICHIGAN

for

Chicago, Duluth & Georgian Bay Transit Co.

CHICAGO, ILLINOIS

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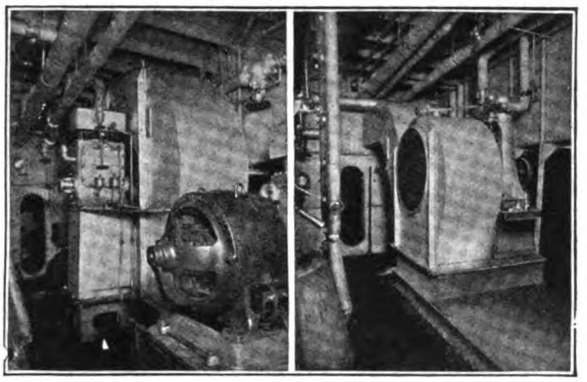

72" Steel Plate Fan—**Both for same duty**—36" "Sirocco" Multi-blade Fan

"Sirocco"
TRADE MARK.

Multi-Blade Fans for Forced Draft

Save Money because they **Save Power.** They save power because their design is such as to make use of **every bit** of energy consumed with the least possible waste.

Catalogue No. 34316 contains reliable information on Mechanical Draft. Yours upon request.

AMERICAN BLOWER COMPANY

DETROIT, MICHIGAN, U. S. A.
Canadian Sirocco Co., Limited, Windsor, Ont., Manufacturer for Canada

Walker's Patent Ship-Logs

Walker's Patent
"Cherub" II Ship-Log

Are Known Throughout the World for Their Accuracy and Durability

Another Testimonial (Unsolicited)

"I have much pleasure in stating that your Cherub Log has been in constant service for a period of over four years, and has given no trouble whatever. It has during that period registered some 190,000 miles and I have no doubt this is the finest Log in the market at the present time."

Thomas Walker & Son, Ltd.

Makers to the British and Many Other Navies

58 Oxford St. Birmingham, Eng.

ESTABLISHED, 1854.

SHERIFFS
MANUFACTURING CO.

Manufacturers of
PROPELLER WHEELS
Marine Engines and Repairs.

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Phone S. 163

H. G. Trout Company
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Manufacturers of High Grade
PROPELLER WHEELS

Marine Engines

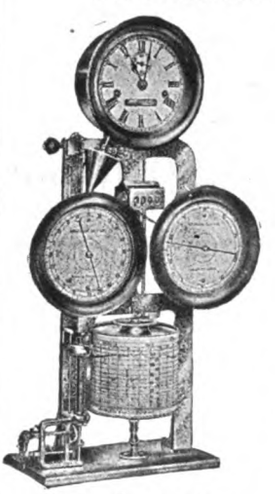
Brass and Iron Casting

Large variety of Grate Bars in stock

Write for particulars and testimonials.

NICHOLSON SHIP LOGS

Far in advance of all other types



Write for Catalogue

The Nicholson Recording Ship Log has recently been installed on the lake bulk freighters Samuel Mather (big) and W. H. Crawford. The lake passenger steamers North American and South American have also been equipped with it. One has also been put aboard the American cup defender Vanitie and orders have just been received for logs for Galatea II owned by E. L. Ford of Detroit, and Aquilo owned by B. T. Rogers, Vancouver, B. C.

The Nicholson Recording Ship Log gives the mileage sailed and shows the exact speed per hour on a dial, recording it on a chart for every minute of the trip.

NICHOLSON SHIP LOG CO.
Cleveland, O.

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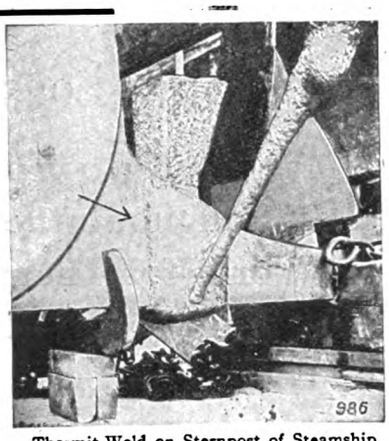

Thermit Weld on Sternpost of Steamship "William Henry Mack"

Quick Marine Repairs

Thermit Welding is quick, easy and effective—and when applied to broken rudder frames, sternposts, or sternframes, will enable your **vessel to return to service in two or three days,** effecting a tremendous saving in dry dock charges.

There is nothing experimental about Thermit Welding. During the last few years we have executed many repairs for the principal steamship companies of the Atlantic and Pacific coasts and the Great Lakes and every repair has been uniformly successful and our best advertisement.

Our process is sanctioned by the British Corporation for the Survey and Registry of Shipping, Glasgow.

If you are interested obtain our pamphlet No. 3440 and Reactions, which illustrate and describe many marine repairs and contain full information about the process. Every marine man should have one.

GOLDSCHMIDT THERMIT COMPANY
WILLIAM C. CUNTZ, Gen. Mgr.
90 West Street, New York
432-436 Folsom St., San Francisco 7300 So. Chicago Ave., Chicago
103 Richmond St., W., Toronto, Ont.

Be on Time!

It is essentially important that the advertiser gets his copy and cuts to us at least ten days before we go to press, as it enables us to give him better type composition, better location and a better opportunity to make corrections on proofs which can then be submitted before publication.

The Last Minute Advertiser

whose copy arrives after the closing date, not only imposes a hardship on us in our efforts to render him satisfactory service, but is himself served to a disadvantage owing to the too limited time in which we have to handle his advertising.

Forms Close on the 8th of Each Month

and, if you wish to be the beneficiary of a perfect Co-operative Service, you will see that your copy and cuts are in our hands at least ten days before the date given above.

The last minute new ads can be handled (without proofs) is 10 A. M. the 10th of each month.

The Marine Review
CLEVELAND, OHIO

Submarine Armor and Diving Apparatus

Improved Bolt Helmet

We manufacture and carry a complete stock of Dresses, Hose and Repair Sundries.
All orders filled day received.
Write for our prices.

A. SCHRADER'S SON, Inc.
Established 1844 32 Rose Street NEW YORK

If You Want To Build, buy, sell, charter, equip, insure, repair, salve or demolish a vessel of any description, consult

Haines Brothers

Marine Surveyors and Salvage Engineers. General Shipping Agts.
OVER 30 YEARS NAUTICAL EXPERIENCE
8 BRIDGE ST. Tel. Broad 368 NEW YORK CITY
SPECIFICATIONS ESTIMATES PLANS

The Great Lakes Red Book, 1914 Edition

A list of more than 1,000 vessels on the Great Lakes, together with the names of the owners, captains and engineers.
Bound with flexible paper cover, pocket size, postpaid anywhere, $1.
A most useful directory. Compiled and published by
THE MARINE REVIEW, Penton Bldg., Cleveland, Ohio

Selling Co-operation Means SUCCESS!

¶ To conduct a live publicity campaign in a trade paper that covers the field like ***The Marine Review*** is to give your sales force the greatest co-operation possible—and at an extremely low cost.

¶ Make 1915 your banner year—an ad in this publication will enable you to do so as the result of concentrated effort.

¶ Write today for rates.

THE MARINE REVIEW
CLEVELAND, OHIO

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Classified Advertisements

Wanted and For Sale

RATES

All classified ads.—four cents (4c) per word. No ad. accepted for less than $1.00.

Remittance should accompany order for one-time ads.

IMPORTANT

Seven (7) words must be allowed for box address.

To insure insertion, copy should reach us before the 10th of the month.

Wanted

WANTED—TWO LARGE TUGS ABOUT 75 and 100 feet long. Send full particulars to L. S. Brittain, Yacht & Vessel Broker, Saugatuck, Mich.

WANTED—COPIES OF THE MARINE REVIEW of July, 1913 and January, 1914. We will extend for three months the subscription of any of our readers who return a copy of either issue before Oct. 10. Address Circulation Department, THE MARINE REVIEW, Cleveland, O.

For Sale

WRITE, WIRE, OR TELEPHONE
Clarence L. Parker, Vessel Agent,
Detroit, Mich.
Boats of every type and description for sale. Send your requirements.

FOR SALE:—LOCOMOTIVE CRANES, McMyler revolving derricks, with clam shells. The Cleveland & Erie Machinery Co., Rockefeller Bldg., Cleveland, O.

THE OWNER OF THE CHOICE MIL-waukee built, 300-ft. freight steamer Thomas Davidson (3,500 tons coal) retiring management now offers her for sale. Also the barge Baltic, about seventy thousand corn or wheat; twelve hundred thousand lumber capacity; large repairs recently. Towing machine, new cable, pumps, etc. Best offer takes them. H. J. Pauly, 165 Eighteenth St., Milwaukee, Wis.

FOR SALE:—ONE TUG. INQUIRE OF
Coast & Interior Contracting Co.,
Fayetteville, N. Y.

FOR SALE:—STR. ROBT. MILLS. CAN be examined at Manitowoc, Wis. Carries 2,700 tons. Address O. G. & D. H. Donaldson, 50 S. Division St., Buffalo, N. Y.

FOR SALE:—TWO SCOTCH MARINE boilers. Now on the dock of The Great Lakes Engineering Works, at Ecorse. These boilers are about 13 ft. diameter and length and were allowed 125 lbs. steam when last inspected. Write O. W. Blodgett, Duluth, Minn.

FOR SALE, TWO TUGS, 12 x 12 Engine, length about 45 feet, beam 12 feet, depth 6 feet. For further information, address Jeffery Tug Line, Duluth, Minn.

FOR SALE: — PASSENGER AND freight steamer; 85 x 17 x 6½; speed 11 miles; 125 passengers; now running and in good order; great bargain. Address Box 87, THE MARINE REVIEW, Cleveland, O.

FOR SALE—STEAMER MOHEGAN IN thorough condition throughout; rates 100; high power; two new Scotch boilers 11 ft. 6 in. x 14 ft. 6 in.; steel boiler house; recently in dry dock; will run 12 miles an hour light or loaded; capacity 1,200 M. ft. lumber; 1,600-1,700 tons coal. Also for sale, consort Mingoe, light draught, good condition, capacity 950 M. ft. lumber, 1,200-1,300 tons coal. Address Graves, Bigwood & Co., Buffalo.

FOR SALE:—NINE SCOWS, VARIOUS dimensions, derricks, pile driver leads, 600 tons Carnegie steel sheeting, wood piling, heavy bridge and dock timber, pumps, engines and boilers, miscellaneous contractor's equipment and ten steel bridges, 2-52 ft., 2-48 ft., 2-45 ft., 2-37 ft., 2-31 ft. Address Edward Gray, foot of Orleans St., Detroit, Mich.

DREDGE FOR SALE.—1 YD. CLAM shell, machinery in fine order, 45-H. P. boiler just installed. Barge 24 x 60. Address Box 178, Cocoanut Grove, Fla.

FOR SALE: — ONE WOODEN HULL passenger and wagon ferry, one wooden hull stern wheel steam tow boat, one steel hull barge, 22 car capacity. For particulars, address Wm. Bawden, Room 413 Union Station, St. Louis, Mo.

RECEIVER'S SALE: — PURSUANT TO order of the United States District Court, the undersigned hereby offers for sale the following equipment of the Standard Contracting Co., now located at Sailor's Encampment, Mich., to wit: Three drill scows and equipment, one derrick schooner, one derrick scow, one coal scow, one dipper dredge and equipment, two tugs, together with blacksmith outfit, flues, plates, round iron, new pipe, bar iron, steel bars, etc. Also miscellaneous stock of oak timber, gear wheels and hawsers. There is also offered for sale additional property of The Standard Contracting Co., located at Cleveland, consisting of dredges, tugs, scows, contractors' equipment and supplies of various kinds. This property can be seen at Sailor's Encampment and Cleveland. Information will be furnished upon request. James H. Cassidy, as receiver of The Standard Contracting Co., 1019 Williamson building, Cleveland, O.

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THE MARINE REVIEW represents the greatest developing power in the Marine Field.

If you need capital to float, market or perfect an idea or invention, or if you have the money and want to locate the man with the idea, secure display space in "the shop window of opportunity"—THE MARINE REVIEW CLASSIFIED SECTION—and you will be able to quickly realize anticipated results.

THE MARINE REVIEW Circulation and Rates guarantee maximum service at a minimum cost.

MISCELLANEOUS "FOR SALE", "Wanted," "Investments" and "Opportunities" ads represent the greatest publicity value obtainable and they're not expensive either. A demonstration will convince you that they produce results.

TURN IT INTO CASH!

THAT'S WHAT YOU CAN DO, IF YOU HAVE ANY MARINE EQUIPMENT, AND VERY QUICKLY TOO, BY MERELY INSERTING A LINER AD IN THE MARINE REVIEW.

AND THE BUYER CAN LOGICALLY ANTICIPATE SIMILARLY SATISFACTORY RETURNS FROM THE SAME SOURCE.

IF YOU WISH TO BUY OR SELL PASSENGER BOATS, FREIGHTERS, SCHOONERS, BARGES, SCOWS, DREDGES, ENGINES, BOILERS OR ANY OTHER EQUIPMENT APPERTAINING TO THE SHIPPING INDUSTRY, THE MARINE REVIEW WILL SERVE YOU NOT ONLY IN A "RESULT-GETTING" MANNER BUT ON A MOST ECONOMIC BASIS.

A MINIMUM AD COSTS ONLY $1.00 AND, IF YOUR REQUIREMENTS CAN BE SUFFICIENTLY BRIEFED (NOT EXCEEDING 25 WORDS), THAT AMOUNT REPRESENTS THE EXPENSE TO YOU FOR A MONTH'S SERVICE.

ONE OF OUR FRIENDS RECENTLY INSERTED AN AD ONE TIME AND, AS A RESULT, SOLD A PASSENGER BOAT AT A VERY SATISFACTORY PRICE. THIS IS NOT AN ISOLATED CASE, BUT ONE IN COMMON WITH THE GENERAL RESULTS REALIZED—NOR COULD IT BE OTHERWISE WHEN THE EXTENSIVE AND DIVERSIFIED CIRCULATION OF THE MARINE REVIEW IS TAKEN INTO CONSIDERATION.

NOW IS AN EXCELLENT TIME TO MAKE YOUR WANTS KNOWN ON ACCOUNT OF THE GENERAL REPAIR WORK WHICH WILL SOON BE UNDER WAY. BY THOSE OF OUR READERS WHO HAVE ANY ACQUISITION OR DISPOSITION WANTS TO MAKE KNOWN, THIS SUGGESTION SHOULD BE CONSIDERED MOST TIMELY AND OPPORTUNE.

FOR QUICK RESULTS, SEND YOUR COPY IN BEFORE THE 8th OF THE FOLLOWING MONTH FOR OUR NEXT ISSUE.

THE MARINE REVIEW,
Cleveland, Ohio.

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Richardson, W. C.
Sullivan, D., & Co.
Vance & Joys Co.

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American Engineering Co.

ARCHITECTS.—(Naval.)
Babcock & Penton
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Donnelly, Wm. T.
Furstenau, M. C.
Hynd, Alexander
Reid, John, & Co.
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ASBESTOS PRODUCTS.
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Holding, Masten, Duncan & Leckie
Hoyt, Dustin, Kelley, McKeehan & Andrews
Kremer, C. E.
Price, Alburn & Daoust
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BARS.—(Iron and Steel—Hollow Staybolt.)
Falls Hollow Staybolt Co.

BEACONS.
Safety Car Heating & Lighting Co.

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Cory, Chas., & Sons

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Blackmer Rotary Pump, Power & Mfg. Co.

BINNACLES.
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BLOCKS.
Raymond, James R.

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Welin Marine Equipment Co.

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American Blower Co.

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Kahnweiler's Sons, David

BOILER CLEANER.
Johns-Manville, H. W., Co.

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Continental Iron Works, The

BOILER REPAIRS.
Michigan Salt Works

BOILER STEAM AND WATER DRUMS.—(Welded.)
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Almy Water Tube Boiler Co.
American Ship Building Co.
Babcock & Wilcox Co.
Bath Iron Works
Chicago Ship Building Co.
Commercial Boiler Works, The
Delaney, P., & Co.
Detroit Ship Building Co.
Fletcher, W. A., & Co.
Great Lakes Engrg. Works
Johnston Bros.
Kingsford Fdy. & Mach. Works
Manitowoc Ship Building & Dry Dock Co.
Milwaukee Dry Dock Co.
Seattle Const. & Dry Dock Co.
Superior Ship Building Co.
Toledo Ship Building Co.
Ward, Chas., Engineering Co.

BOOKS.
Penton Publishing Co., The

BRASS GOODS.
Penberthy Injector Co.

BROKERS.—(Steamship Freight.)
McCarthy, T. R.

BROKERS.—(Vessel.)
Boland & Cornelius
Richardson, W. E., & Co.
Sullivan & Co., D.
Watts, J. Murray

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BUOYS.
Kahnweiler's Sons, David

BUOYS.—(Gas & Spar.)
Safety Car Heat'g & Lighting Co.

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Armstrong Mfg. Co.

CABLES.
American Steel & Wire Co.
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Waterbury Co.

CAPSTANS.
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Dake Engine Co.
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Furstenau, M. C.
Hynd, Alexander

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Detroit Ship Building Co.
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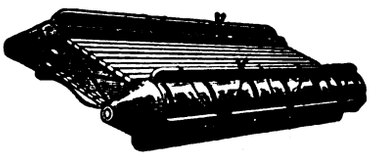

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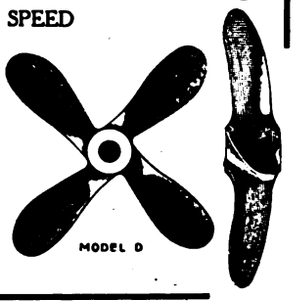

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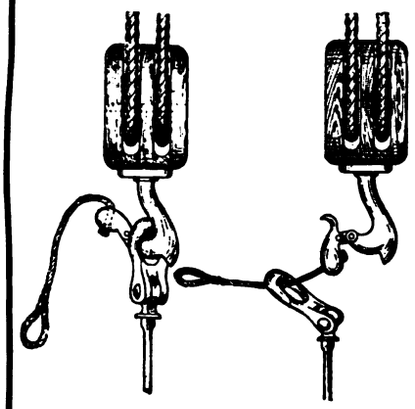

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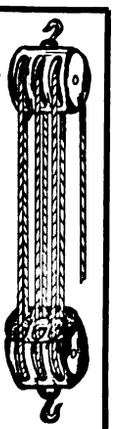

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Curr, Robert
Furstenau, M. C.
Haines Bros.
Hunt, Robert W., & Co.
Hynd, Alexander

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General Electric Co.

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American Steel & Wire Co.

TANKS.
Bath Iron Works

TANKS.—(Steel.)
Fore River Ship Building Corp.

TANKS.—(Welded Steel.)
Continental Iron Works, The

TELEGRAPH.—(Mechanical.)
Cory, Chas., & Sons

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Babcock & Penton
Curr, Robert
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Hunt, Robert W., & Co.
Hynd, Alexander

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Chase Machinery Co.

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Waterbury Co.

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Fore River Ship Building Corp.

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Chase Machine Co.
Hyde Windlass Co.
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American Ship Building Co.
Dake Engine Co.
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Waterbury Co.

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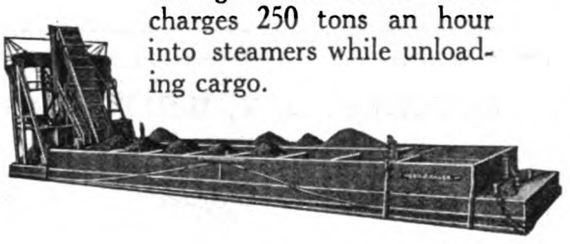

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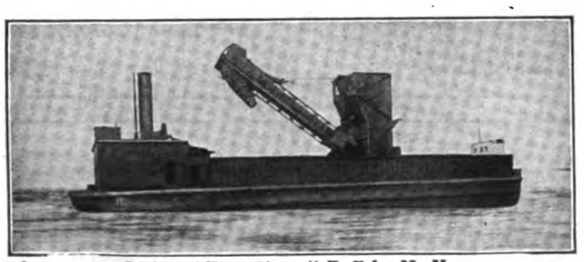

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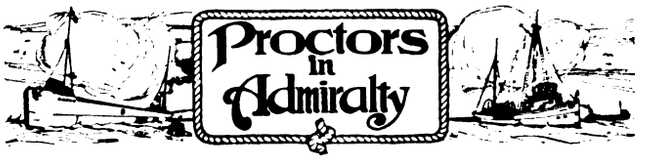

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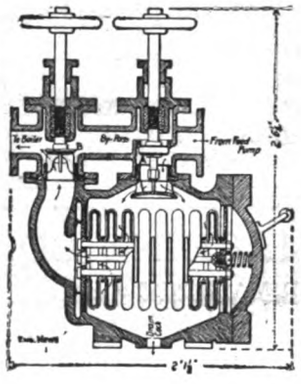

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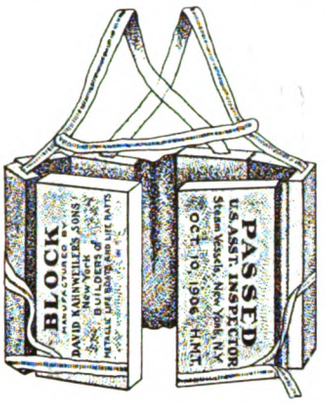

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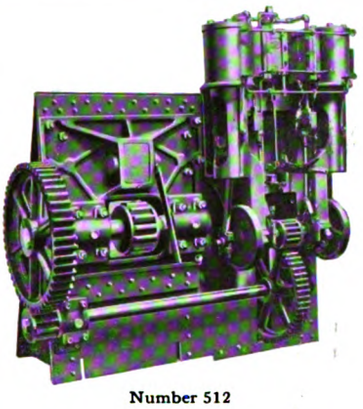

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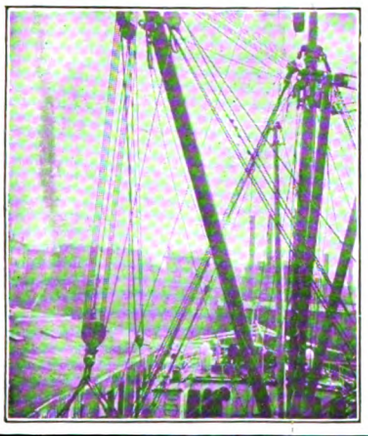

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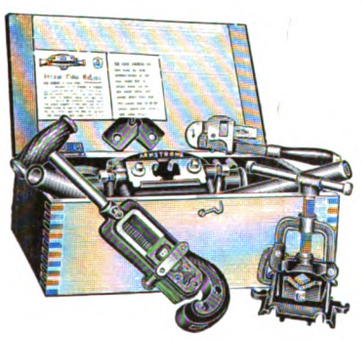

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